The Trait Experience of Intrinsic Motivation

Conceptualizing Intrinsic Motivation as an Individual Difference Construct and Validating a Newly Designed Scale for its Measurement

Thesis

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I dedicate this doctoral thesis

to my mother and father

who gave me life

sparked enthusiasm in me

and granted me the freedom to pursue my passions

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ABSTRACT

Previous research tried to explain intrinsic motivation mainly by activity contents and situational determinants. Several established traits, like positive affectivity, implicit motives, and emotion regulation ability, however, suggest that individuals differ in how much they experience intrinsic motivation during activities regardless of content or situation. In the present thesis, I report on the construction of the Trait Experience of Intrinsic Motivation Scale (TEIMS), which aims to measure such individual differences directly. The TEIMS had an internally consistent one-factor structure; good test-retest reliabilities over 1 and 4 months; measurement invariance regarding gender (strong) and time (partial strong); and was not redundant with measures in a wide nomological net. Results of five studies attested to the TEIMS's criterion validity: It predicted intrinsic motivation in various activities, operationalized as activity enjoyment, low boredom, and voluntary persistence in a free-choice paradigm. It usually did so incrementally over established traits. Results from moderation analyses in three studies suggest that the TEIMS predicts momentary intrinsic motivation regardless of task aversiveness, which informs about possible underlying processes. This thesis contributes an individual difference perspective to the so far situation-focused field of intrinsic motivation research. With the TEIMS, it provides a reliable and valid measure for research and application.

KURZFASSUNG

Bisherige Forschung hat versucht, intrinsische Motivation mittels Tätigkeitsinhalten und situationaler Determinanten zu erklären. Mehrere etablierte Traits legen jedoch nahe, dass Personen sich darin unterscheiden, wie viel intrinsische Motivation sie bei Tätigkeiten ungeachtet derer Inhalte oder der Situation erleben. In der vorliegenden Dissertation beschreibe ich die Entwicklung der Trait Erleben Intrinsischer Motivation-Skala (TEIMS), welche solche interindividuellen Unterschiede direkt messen soll. Die TEIMS hatte eine intern konsistente Einfaktorstruktur, gute Test-Retest-Reliabilitäten über 1 und 4 Monate, Messinvarianz bezüglich Geschlecht (stark) und Zeit (partiell stark) und war nicht mit Massen eines weiten nomologischen Netzes redundant. Ergebnisse aus fünf Studien belegen die Kriteriumsvalidität der TEIMS: Sie sagte intrinsische Motivation in verschiedenen Tätigkeiten, operationalisiert als Tätigkeitsfreude, niedrige Langeweile und freiwillige Persistenz in einem „Free Choice“-Paradigma, vorher. Sie tat dies meist inkrementell über etablierte Traits. Die TEIMS sagte momentane intrinsische Motivation unabhängig von Tätigkeitsaversivität vorher, was Aufschlüsse über mögliche zugrundeliegende Prozesse gibt. Die vorliegende Dissertation steuert eine Perspektive interindividueller Unterschiede zu dem bislang situationsfokussierten Feld der intrinsischen Motivationsforschung bei. Mit der TEIMS bietet sie ein reliables und valides Mass für Forschung und Anwendung.

SUMMARY

In the *Introduction*, I argue that previous research on intrinsic motivation, that is, the motivation to perform an activity for its inherent rewarding characteristics, has neglected a potentially important idea for improving prediction, theory, and application: The idea that individuals might differ in their general tendencies to experience intrinsic motivation during activities. I outline how established traits suggest that such tendencies exist and review how existing individual difference constructs explicitly related to intrinsic motivation do not address such tendencies. I then formulate the two primary research questions of the present thesis: (1) Are there stable individual differences in the tendency to experience intrinsic motivation during activities in general and (2) if so, do these differences predict momentary intrinsic motivation in a variety of concrete activities?

I addressed research question 1 primarily in the *Pilot Study* and *Study 1*. In the Pilot Study, I explored if individuals reported the proposed differences on an initial version of a newly designed scale. Participants reported such differences, and the initial scale showed good psychometric properties and predictive validity. Therefore, in Study 1, I examined the psychometric properties and nomological of the final, improved version of the so-called Trait Experience of Intrinsic Motivation Scale (TEIMS) in a large sample of adults (N = 997). The final TEIMS also showed good psychometric properties and was meaningfully related to, but not redundant with, any of the 47 measures in its nomological net.

I addressed research question 2 primarily in *Studies 2 through 6*. In Study 2, I tested the TEIMS's predictive validity regarding momentary intrinsic motivation, operationalized as the self-reported enjoyment of three experimental tasks and of 30 activities that were presented in vignettes. In this correlational online study, the TEIMS positively predicted both outcomes with small to moderate effects. In Study 3, I replicated these findings regarding a goal-directed activity, namely gym exercise, using ambulatory assessment. TEIMS scores at baseline predicted exercise enjoyment in gym sessions that occurred up to a month after baseline, increasing the external validity of the findings. In Study 4, I extended the test of predictive validity to two other indicators of momentary intrinsic motivation, one of which was behavioral: Low self-reported boredom and high voluntary persistence in a free-choice paradigm. The TEIMS predicted both outcomes regarding an experimental

task at wave 1 of data collection, but not persistence in the final sample (which previously had been augmented to increase the accuracy of estimates). In Study 5, I tested if the findings from Study 4, wave 1, could be replicated with a different experimental task. The TEIMS predicted voluntary persistence, but the association with boredom, while in the hypothesized direction, was not significant. Hence, in Study 6, I attempted a final replication that was methodologically very close to Study 5, but used a larger sample. Finally, like in Study 4, wave 1, the TEIMS predicted both indicators of intrinsic motivation.

In addition to the two primary research questions, I pursued three secondary aims in the present thesis. First, in Studies 2 through 6, I tested the incremental validity of the TEIMS over various established traits and, second, explored those traits' predictive validities regarding momentary intrinsic motivation. The TEIMS showed good incremental validity, while the established traits fared poorly. Third, I took first steps to test possible processes underlying the latent construct measured by the TEIMS in the Pilot Study and Studies 5 and 6. As detailed in the thesis, whether the TEIMS would predict intrinsic motivation in interaction with or independently of activity aversiveness would inform about whether self-regulatory or non-regulatory processes are likely to underlie the TEIMS. The TEIMS predicted intrinsic motivation equally well regardless of activity aversiveness, which suggests that non-regulatory processes underlie it.

I tested in three *meta-analyses* if the TEIMS predicted the three indicators of momentary intrinsic motivation overall significantly, even though it had not regarding every indicator in every study. This also allowed me to estimate the average effect size for each indicator over all relevant studies.

In the *General Discussion*, I summarize and discuss the findings with regard to the two research questions. I further discuss them in the context of two long-standing controversies in intrinsic motivation research, namely the definition of intrinsic motivation and its relation to extrinsic motivation. Moreover, I point out limitations of the present thesis and outline avenues for future research. Future inquiry should help achieve a deeper understanding of how the latent construct behind the TEIMS functions, if and how it can be trained, and what it can accomplish for research and application. Finally, I give recommendations on how the TEIMS might be improved in a future version.

INTRODUCTION

People vary wildly on the activities they enjoy—what makes one person rejoice, makes another person cringe. One person, for example, might enjoy writing a novel, while another person would find the sheer magnitude of the task overwhelming and the mostly solitary way of pursuing it unbearable. That other person might enjoy working with children instead, while the novelist would be horrified by the thought of all the high-pitched screams and sticky hands. Both persons could likely talk about what they love about writing and child care, respectively, be it conjuring up a vivid world out of thin air versus enjoying the vitality and ingenuousness of children. These two persons have activities in their lives that fill them with pleasure when they engage in them. Such questions of pleasure from specific activity contents that fit persons' preferences, interests, competencies, and needs have been extensively studied and are reasonably well understood (Deci & Ryan, 2000; Schultheiss & Brunstein, 2010; Silvia, 2006).

Another prominent way, in which researchers have thought about pleasure during activities is by looking at situational factors that allow or prevent this experience (e.g., Deci, Koestner, & Ryan, 1999). For example, would a child enjoy drawing more or less if he or she expected a cookie as a reward? Other such questions include, if the way in which activities are instructed matters, if being able to choose an activity makes a difference, and which kinds of feedback, if any, are beneficial for experiencing pleasure during an activity.

Aiming to contribute a novel perspective, in the present thesis I explored pleasure during activities regardless of activity contents or situational factors.

Instead, I asked if individuals differ in how much pleasure they *generally* experience during activities, regardless of the above influences. Might a person on one end of the spectrum generally not enjoy most activities at all, while a person on the opposite end might generally enjoy most of what they do? Regardless of whether those activities include writing a novel, caring for children, mowing the lawn, or working on a computerized experimental task. Also regardless of whether those individuals expect cookies as rewards, are instructed in a certain way, choose the activity for certain reasons, or do not get to choose the activity at all. Would there be differences in pleasure between people, if all these tried and trusted variables were left aside? Could individuals accurately indicate them on a psychological measure like they can in the case of pleasure from specific activity contents? And could these differences consistently predict the momentary experience of any given activity?

Specifically, I hypothesized and demonstrated that there are stable individual differences in the tendency to generally experience pleasure during activities and that these differences predict the momentary experiences of activities in a variety of situations, including goal pursuit. No previous research has, to my knowledge, proposed such individual differences. Therefore, I tested, whether individuals reported such differences on a newly developed scale. I examined the scale's psychometric properties and tested, if it predicted several indicators of a pleasant momentary activity experience, specifically activity enjoyment, low boredom, and voluntary persistence in a free-choice paradigm (Touré-Tillery & Fishbach, 2014). Additionally, I tested the scale's incremental validity over relevant established traits, specifically positive affectivity, implicit motives, and emotion regulation ability, and tested how well these traits predicted momentary pleasure themselves. Lastly, in order to get first insights into what kind of mechanisms might underlie the latent construct measured by the scale, I tested whether the scale interacted with the aversiveness of an activity when predicting the momentary experience of it. The results of the present thesis could be very valuable for improving the prediction of pleasure during activities, extend current theories in the field, and inform applications that aim to predict and foster pleasure during activities.

POSITION OF THE PRESENT THESIS IN MOTIVATIONAL PSYCHOLOGY AND DEFINITIONS OF SOME BASIC TERMS

In the present thesis I aimed to contribute to one of the most fundamental questions in motivational psychology (e.g., Weiner, 1985): Why do people do the things that they do (rather than other things or "nothing")? The answer of a contemporary motivational psychologist would probably be that they do the things that they do, because *motivation* drives them to. There is no single consensual definition of motivation, but all definitions share the etymological origin of the word, namely the Latin verb *movere*, which means "to move." Most definitions also share the notion that motivation comprises processes that direct ("*what* is a person going to do?") and energize ("*how persistently and intensely* is a person going to do it?") behavior (Brandstätter, Schüler, Puca, & Lozo, 2013; Elliot, 2008; Higgins, 2012; Reeve, 2009).

So, generally, in what directions does motivation energize people to move? On the most rudimentary level the answer would have to be toward positive states and away from negative states (e.g., Elliot, 2008; Freud, 1915/1952; James, 1890). Examples are motivations toward a friend one coincidentally bumped into and away from the fierce sun on a hot summer's day. Even in times of a replication crisis in psychology (Ioannidis, 2005; John, Loewenstein, & Prelec, 2012; Open Science Collaboration, 2015; Simmons, Nelson, & Simonsohn, 2011), the basic notion that humans try to approach pleasure and avoid pain remains unchallenged. These two general motivations are likely evolved propensities in all motivated beings and benefit the survival of a species (Tooby & Cosmides, 1990). Further underscoring how fundamental these two motivations are considered to be, some authors even argue that having motivation would be pointless, if an organism did not also have the capacity to approach beneficial states and avoid harmful ones (Baumeister, 2016).

In the present thesis, I mostly avoided the topic of pain and approached the topic of pleasure, or more precisely, *how much* pleasure humans generally experience in their lives. As I discuss in more detail below, the extent to which persons generally experience pleasure during activities has important implications for selecting, initiating, maintaining, and succeeding in behaviors, or with other words "the things that people do."

The sources of human pleasure are often called incentives.[1] There are several different, yet similar, uses of the term "incentive." According to Beckmann and Heckhausen (2018), incentives are stimuli that arouse situational or long-term approach motivation in a particular person, because in that person's learning history those stimuli had been paired with positive affect. Hence, attaining those incentives elicits positive affect (i.e., pleasure) for that person. Schmalt (1996) goes as far as to equate incentives with anticipated positive affect. Complementing the above definition by Beckmann and Heckhausen (2018), who only consider acquired incentives, some innate motives, i.e. preferences for classes of incentives (McClelland, Koestner, & Weinberger, 1989), like sex or food, are associated with innate, non-acquired incentives (e.g., Drewnowski, 1997). According to these definitions, incentives have, both, a signaling and a satisfying quality.

Examples of incentives are delicious food (or, in fact, any food when starving), feelings of competence during a challenging activity, and spending time with loved ones, but also praise, status, and money. From the examples above, it might become apparent that incentives can be located within activities themselves (so called *activity-incentives*; the first three of the above examples; Rheinberg, 1989) or outside of them, namely in the desired goal states that the activities are supposed to bring about (so called *goal-incentives*; the latter three examples; Rheinberg, 1989). These two locations map nicely unto a fundamental distinction in motivational psychology that is highly relevant for the experience of pleasure during activities and central to the present thesis: The distinction between intrinsic and extrinsic motivations (Sansone & Harackiewicz, 2000).

WHAT IS INTRINSIC MOTIVATION AND WHICH DEFINITION IS AT THE BASIS OF THE PRESENT THESIS?

Literally speaking, intrinsic and extrinsic motivations refer to the motivations of the behaviors being either intrinsic (i.e., inherent) or extrinsic (i.e., external) to the

[1] Strictly speaking, incentives can have either positive or negative value, depending on which affect they are associated with (Beckmann & Heckhausen, 2018). For brevity and clarity, I use the term "incentive" when I refer to incentives with positive value and the term "disincentive" when I refer to incentives with negative value.

behaviors in question (Rheinberg & Engeser, 2018). Following this logic, an example for an intrinsically motivated behavior would be to run for the sensation of feeling ones muscles work, because this sensation is intrinsic to running. Note that this sensation is not unique to running, because it also occurs during other physical activities; therefore, it is not definitionally necessary that the intrinsically motivating aspect of an intrinsically motivated behavior is unique to that behavior (although some authors argue and find that uniqueness increases intrinsicality; Kruglanski, Fishbach, Woolley, Bélanger, Chernikova, Molinario, & Pierro, 2018). An example for an extrinsically motivated behavior would be to run to impress others, because impressing others is not inherent to running (and might not even occur once while running), but rather is a hoped for *consequence* of running (therefore, activity-extrinsic).

Despite this straightforward logic, the definition of intrinsic motivation is controversial, and confusion about the term is well documented (e.g., Dyer & Parker, 1975). Kruglanski and colleagues (Kruglanski et al., 2018, p. 167) speak of a "definitional duality," while Heckhausen (1989) describes even six different conceptualizations of intrinsic motivation and suggests that there actually might be more. In both texts, the authors suggest historical reasons for the lack of consensus and clarity. Since its beginning in the early 20th century (Bühler, 1922; Woodworth, 1918), intrinsic motivation research seemed to gain traction in times when psychologists overly leaned on the consequences of behavior when trying to explain behavior (Heckhausen, 1989). This was especially the case starting in the 1950s, when behaviorism and its explanation of behavior through its consequences reached a pinnacle. Revealing shortcomings in behavioristic theories, researchers observed more and more behaviors, such as spontaneous exploration and manipulation of the environment, which occurred irrespective of their consequences (Harlow, Dodsworth, & Harlow, 1965; Yerkes & Yerkes, 1929). Further such seemingly intrinsically motivating activity contents were related to, among others, self-assertion (Woodworth, 1918), curiosity (Berlyne, 1960; 1966; Woodworth, 1918), challenge (White, 1959), and a sense of control (Hunt, 1961).

The confusion about the definition of intrinsic motivation might have begun, when these findings that some activity contents *could* be intrinsically motivating

were taken to imply that the activity contents *were* what defined intrinsic motivation (Kruglanski et al., 2018). Self-determination theory (Deci & Ryan, 1985; Ryan & Deci, 2017), arguably the most prominent theory in intrinsic motivation research to date and therefore portrayed in a dedicated section below, is based on such a content-specific definition of intrinsic motivation, which might have prolonged this confusion to the present day. One shortcoming of the content-specific definition is that behaviors with allegedly intrinsically motivating contents, like exploration, can be motivated by activity-extrinsic incentives. For example, a 19th century explorer who sailed off to explore South America might have been primarily motivated by the prospect of money and fame upon success, two incentives extrinsic to the activity of exploring South America. Vice versa, contents other than the ones specified by content-specific definitions can be intrinsically motivating. For example, monetary payments, which usually are considered prototypes of activity-extrinsic incentives, can increase intrinsic motivation when they are intrinsic to the content of an activity (Kruglanski, Riter, Amitai, Margolin, Shabtai, & Zaksh, 1975). Such studies, which support a content-free and more literal definition of intrinsic motivation (as outlined in the first paragraph of this section) are in the minority, while research relying on a content-specific understanding of intrinsic motivation "inspired the lion's share of intrinsic motivation research" (Kruglanski et al., 2018, p. 166).

To "rectify this omission" (Kruglanski et al., 2018, p. 167), Kruglanski and colleagues introduced a structural framework for intrinsic motivation called the *means-ends fusion theory*, in which they propose that a behavior is the more intrinsically motivated the more the person who performs it subjectively perceives it as identical to the behavior's goal. In other words, the larger the fusion of a means with its end, the more intrinsic the motivation is to the means. Also Heckhausen (1989, p. 460), who reviewed six conceptualizations of intrinsic motivation (which I do not review in the present thesis for the sake of brevity), concluded that such a structural definition of intrinsic motivation was the clearest. Hence, and due to the discussed shortcomings of the content-specific definition of intrinsic motivation, I subscribed to the structural definition of intrinsic motivation in the present thesis.

Another question relevant to the definition of intrinsic motivation is its relation to extrinsic motivation. Based on the literal definition from the first paragraph of this

section, intrinsic and extrinsic motivations refer to the locations of the motivations with regard to the behavior in question: They are either within or outside of the behavior they motivate (Rheinberg & Engeser, 2018). Consequently, in principle, a behavior could be motivated by intrinsic *and* extrinsic motivations simultaneously. For example, a person could be motivated to run to feel his or her muscles work and to impress others.

As with the definition of intrinsic motivation itself, the relationship between intrinsic and extrinsic motivations has been controversial in the literature despite the relative clarity within a literal understanding of the terms. On the one hand, some research suggests that intrinsic and extrinsic motivations are mutually exclusive (e.g., Deci & Ryan, 1985; Gagné & Deci, 2005; Ryan & Deci, 2017) and that extrinsic rewards can corrupt intrinsic motivation (e.g., Deci et al. 1999). On the other hand, other research suggests that they can occur simultaneously and can have additive effects (Amabile, Hill, Hennessey, & Tighe, 1994; Cerasoli, Nicklin, & Ford, 2014; Fishbach & Choi, 2012; Freitas & Higgins, 2002; Goswami & Urminsky, 2017; Hennessey, Amabile, & Martinage, 1989; Hennessey & Zbikowski, 1993; Lepper, Corpus, & Iyengar, 2005; Lepper & Henderlong, 2000; Ouyang, Zhu, Fan, Tan, & Zhong, 2015; Woolley & Fishbach, 2016; 2018). The means-ends fusion theory (Kruglanski et al., 2018) also suggests that intrinsic and extrinsic motivations can occur simultaneously, but that they are not additive. Instead, as discussed in more detail in a dedicated section below, the authors of the theory propose an intrinsicality continuum with pure intrinsic and extrinsic motivations on the respective scale ends and gradations of different proportions of the motivations in between. They furthermore derive specific hypotheses on when extrinsic rewards should corrupt, but might also enhance, intrinsic motivation and cite published findings that are consistent with their hypotheses (Goswami & Urminsky, 2017; Harackiewicz, Manderlink, & Sansone, 1984; as cited in Kruglanski et al., 2018). In the present thesis, I also assume that intrinsic and extrinsic motivations can co-occur and demonstrate that even primarily extrinsically motivated activities (such as assigned experimental tasks or activities during goal-pursuit) can, to some degree, be experienced as intrinsically motivating, that is, as enjoyable, interesting, or engaging.

In sum, while there is a straightforward literal definition of intrinsic motivation, there is—likely due to historical reasons—a wide-spread confusion about it (as being related to specific activity contents). Likewise, there is controversy about the relationship between intrinsic and extrinsic motivations, although the literal definition is, again, very clear about their relationship. Regarding both issues, I subscribed to the theoretical definition that in my view most clearly resembles the literal definition, namely the means-ends fusion theory's structural definition of intrinsic motivation.

SELF-DETERMINATION THEORY AND INTRINSIC MOTIVATION

Self-determination theory (SDT; Deci & Ryan, 1985; Ryan & Deci, 2017) is arguably the most prolific theory of intrinsic motivation research to date. Illustrating this, in the year 2017 alone, the publications by the founding fathers of SDT, Edward L. Deci and Richard M. Ryan, taken together were cited over 55,000 times according to Google Scholar. To put this number into perspective: The *life-time* citations of Arie W. Kruglanski, who advanced the means-ends fusion theory and is a very successful motivation scientist in his own right, amount to "merely" 38,000. Research using the SDT framework is prevalent in basic psychological research (e.g., Deci & Ryan, 2000) and applied fields like educational psychology (e.g., Deci, Vallerand, Pelletier, & Ryan, 1991), industrial and organizational psychology (e.g., Gagné & Deci, 2005), clinical and health psychology (e.g., Ryan & Deci, 2008; Ryan, Patrick, Deci, & Williams, 2008), sports psychology (e.g., Vallerand, 2007), and couple psychology (e.g., LaGuardia, Ryan, Couchman, & Deci, 2000).

Strictly speaking, SDT is not a single theory, but a framework including six loosely interrelated "mini-theories" (Ryan & Deci, 2017, p. 121): *Cognitive evaluation theory*, *organismic integration theory*, *causality orientation theory*, *basic psychological needs theory*, *goal contents theory*, and *relationships motivation theory*. Out of these six theories, the last two are mostly irrelevant for the present

thesis, the first three are tangentially relevant[2], and only basic need theory is directly relevant. This is why—also for the sake of brevity—I will only elaborate on the latter.

Basic need theory, posits that an activity is intrinsically motivated, when the activity or the situation in which it is performed allow people to fulfill one or more of the basic psychological needs for autonomy, competence, and relatedness (Deci & Ryan, 2000). This reveals the content-specific definition underlying basic need theory, because activity contents and situational factors that do not facilitate the fulfillment of one or more of the three needs cannot, according to the theory, be intrinsically motivating. Corroborating this point, Ryan and Deci (2000a, p.70) write: "Thus, our theory of intrinsic motivation does not concern what causes intrinsic motivation (which we view as an evolved propensity [...]); rather, it examines the conditions that elicit and sustain, versus sub-due and diminish, this innate propensity." Hence, studies have mostly focused on situational influences on intrinsic motivation through basic need satisfaction. Such influences include positive feedback (Deci et al., 1999), tangible rewards (Deci et al., 1999), the behavior of teachers (Guthrie, Wigfield, & VonSecker, 2000), or class environment (Jang, Reeve, Ryan, & Kim, 2009).

These variables explain sizable amounts of variance in intrinsic motivation between persons, for example, 26–35% in work-related intrinsic motivation (Dysvik, Kuvaas, & Gagné, 2013). Yet, there is substantial unexplained variance, which individual differences in the tendency to experience intrinsic motivation, as proposed in the present thesis, might help explain. Investigating such individual differences is also timely because of the recent surge of interest in studying intrinsic motivation outside of the SDT framework (e.g., Bélanger, Schori-Eyal, Kruglanski, Lafrenière, 2015; Fishbach & Choi, 2012; Kruglanski et al., 2018; Moneta, 2012; Woolley & Fishbach, 2015; 2016). For example, Woolley and Fishbach (2016) found that

[2] I regard these three theories as merely tangentially relevant, because they mostly address intrinsic motivation in relation to extrinsic motivation and do not seem directly relevant for the experience of intrinsic motivation in general. First, cognitive evaluation theory concerns how extrinsic rewards, feedback, and other activity-extrinsic events affect intrinsic motivation. Second, organismic integration theory specifies the internalization of extrinsic motivation through several stages toward higher perceived autonomy (but never penetrating the category of intrinsic motivation). Third, causality orientations theory describes individual differences in the tendencies to focus on specific aspects of the environment, which allow persons to act more or less autonomously, controlled, or amotivated, respectively.

participants, who were instructed to attend to rewarding aspects of an activity showed higher intrinsic motivation. While this focus on rewards (or, in other words, activity-intrinsic incentives) was experimentally manipulated, there may also be meaningful "natural" individual differences in how much people attend to rewards of activities and therefore experience intrinsic motivation. Further, there are, as I discuss in a dedicated section below, established traits that suggest the existence of individual differences in the experience intrinsic motivation.

Taken together, out of the six theories summarized under the highly pervasive SDT umbrella, only basic need theory is directly relevant to the present thesis. It has inspired a lot of work investigating activity contents and situational factors that facilitate the experience of intrinsic motivation, which, as described in the first two paragraphs of this thesis, I did not aim to add to. Instead, I aimed to test whether, irrespective of the above influences, individuals would differ in their tendencies to experience intrinsic motivation. I now turn to describing the means-ends fusion theory of intrinsic motivation, which is much more relevant to the present thesis than SDT is.

THE MEANS-ENDS FUSION THEORY OF INTRINSIC MOTIVATION

The means-ends fusion theory (Kruglanski et al., 2018) does not only provide the structural definition of intrinsic motivation that underlies the present thesis, but understanding its basic propositions will also help interpret the findings of the present thesis and help clarify how the *experience* of intrinsic motivation can be understood and measured. The theory builds on Arie W. Kruglanski's earlier work on intrinsic motivation (e.g., Kruglanski, 1975; Kruglanski et al., 1975; Shah & Kruglanski, 2000) and his goal-systems theory (Kruglanski, Shah, Fishbach, Friedman, Chun, & Sleeth-Keppler, 2002); it aims to provide a social cognitive perspective on intrinsic motivation that, compared to theories based on content-specific definitions of intrinsic motivation, is more consistent with the term's literal meaning, namely a motivation that lies within the behavior in question. Concerning this matter, Kruglanski and colleagues go as far as to say that previous, content-

specific research on intrinsic motivation (such as within the SDT framework) has investigated an "essentially unrelated" question compared to their own structural approach (Kruglanski et al., 2018, p. 165). The authors draw on evidence from social cognitive, animal learning, and brain-physiological research to specify how intrinsic motivation is formed by the process of *means-ends fusion*.

As mentioned in the section on the definition of intrinsic motivation, the theory sees behavior as the more intrinsically motivated the more its actor perceives it as fused (i.e., isomorphic, identical) with the behavior's goal. Hence, the authors propose an intrinsicality continuum based on the level of fusion, with the respective scale ends representing pure intrinsic motivation (full fusion) and extrinsic motivation (zero fusion) as well as gradations of different proportions of the motivations between them. The fusion is theorized to occur in the direction from activity to goal, that is, the activity becomes more and more similar to the goal by taking on the goal's properties. Two goal properties are regarded as especially important in this context, namely *goal magnitude* (Kruglanski, Chernikova, Rosenzweig, & Köpetz, 2014), which influences the *degree* of motivation (i.e., more vs. less motivation), and *goal-derived affect*, which influences the specific *experience* during the activity. Note that goal magnitude and motivation intrinsicality are seen as orthogonal, so a person could be, for example, purely intrinsically, but in terms of degree only moderately, motivated toward an activity or mostly extrinsically, but very strongly, motivated toward an activity.

Goal-derived affect describes the kind of affect that would be experienced during goal attainment and with increasing fusion increasingly already during an activity. Note that this idea is consistent with an earlier structural view of intrinsic motivation based on the incentive concept, which states that intrinsically motivated activities are experienced as pleasurable, because activity-intrinsic incentives are attained while engaging in these activities (Rheinberg, 1989). Based on the finding that affect during goal attainment varies as a function of the regulatory focus of the goal (Higgins, Shah, & Friedman, 1997), the affect during an activity that is fused with a promotion goal should be enjoyment and pleasure, while the affect borrowed from a prevention goal should be calm and relief. Bringing together these notions in the above example of running, with increasing fusion, the activity of running would

become more and more synonymous with the, for example, moderately large approach goal of feeling one's muscles work and therefore be experienced as moderately (as opposed to slightly or extremely) motivating and enjoyable (as opposed to relaxing).

Four antecedents that are based on Gestalt psychology (e.g., Wertheimer, 1923) and learning theory (e.g., Hilgard & Bower, 1966) are supposed to increase fusion: *Repeated coupling*, *linkage uniqueness*, *similarity*, and *immediacy*. First, *repeated coupling* between activity and goal is theorized to fuse them into one Gestalt and transfer the goal's properties to the activity, much like the properties of an unconditioned stimulus are transferred to a conditioned stimulus through repeated coupling in classical conditioning (see also Custers & Aarts, 2005). In the above example, fusion would be increased by repeatedly running to attain the goal of feeling one's muscles work. Second, *linkage uniqueness*, and with it fusion and intrinsic motivation, is the larger the fewer activities are linked to a goal and the fewer goals are linked to an activity (Anderson, 1983; Kruglanski, Köpetz, Bélanger, Chun, Orehek, & Fishbach 2013; Zhang, Shah, & Kruglanski, 2007). For example, if running was the only means to feeling one's muscles work and would have no other goals than this, then uniqueness would be maximized and running would be highly intrinsically motivated. Third, the theory also assumes that the higher the (e.g., semantic, but also other) *similarity* between activity and goal, the stronger the fusion. For example, an activity like "workout with electrical muscle stimulation" should be easier to fuse with the goal "feel one's muscles work" than the activity "running," because it explicitly mentions "muscles," and "stimulation" is semantically similar to "work." Fourth and lastly, temporal *immediacy* between activity and goal is said to increase their fusion, just as temporal contiguity between stimuli is an important factor in learning theory (Balsam, Drew, & Gallistel, 2010). These antecedents are theorized to have additive effects, so not every single antecedent has to be given for maximum fusion, and the more of them are given for any activity-goal pair the stronger their fusion. The effects are also assumed to be reversible, so just as increases in, for example, linkage uniqueness would increase fusion, decreases in uniqueness would decrease fusion.

Importantly, means-end fusion is theorized to have two major consequences, which are relevant for the experience of intrinsic motivation and its measurement. The first consequence stems from the aforementioned goal-derived affect, which results in a *pleasant experience* of intrinsically motivated activities. The second consequence stems from the perception that an activity is highly instrumental to the goal it is fused with; a highly fused activity is perceived as instrumental, because it is mentally represented as identical with the goal, so engaging in the activity would mean attaining the goal. Consequently, individuals should *readily persist* in an activity (e.g., "running") while the goal it is fused to (e.g., "feeling one's muscles work") is active. Both, a pleasant experience and voluntary persistence (i.e., persistence without external rewards or pressures and while alternative activities are available), have been classic measures of the momentary experience of intrinsic motivation (e.g., Deci, 1971; Lepper, Greene, & Nisbett, 1973, Kruglanski et al., 1975) and are also used in the present thesis. In addition to activity enjoyment, I operationalized a pleasant activity experience as low boredom (see Csikszentmihalyi, 1975/2000; Eastwood, Frischen, Fenske, & Smilek, 2012; Westgate & Wilson, in press).

By specifying a pleasant experience and voluntary persistence as *consequences* of fusion, the theory explicitly differentiates two aspects of intrinsic motivation that often have been confounded in previous research (e.g., Csikszentmihalyi, 1975/2000; Dyer & Parker, 1975): (1) intrinsic motivation in the more literal meaning of the word, namely as a kind of motivation, and (2) the resulting experience of intrinsic motivation, which renders an activity as pleasant and easy to maintain. First, acknowledging that intrinsic motivation is first and foremost a *motivation* and therefore comprised of processes that direct and energize behavior (e.g., Brandstätter et al., 2013), reveals that it does not include an experiential aspect by this definition. Based on its etymological origin, intrinsic motivation is a "mover," it is a *reason* why a behavior is performed. Only as a consequence, as specified by means-ends fusion theory, does the intrinsicality of motivation *manifest* itself in the experience of an activity (see also Elliot & Harackiewicz, 1996, p. 462): It can be experienced through the goal-derived positive affect and the readiness to maintain behavior through perceived instrumentality. Constructs related to individual differences in the first,

motivational aspect of intrinsic motivation already exist (Amabile et al., 1994; Guay, Mageau, & Vallerand, 2003; Rheinberg, Iser, & Pfauser, 1997; see the section on individual difference constructs explicitly related to intrinsic motivation below). In the present thesis in contrast, I was interested in individual differences in the second, experiential aspect of intrinsic motivation.

In sum, the means-ends fusion theory builds on approximately a century of theorizing and empirical research (spanning from behavioristic animal studies to the more recent goal-systems theory) to provide a contemporary, structural analysis of intrinsic motivation. With this structural approach, it aims to resolve the confusion about the definition of intrinsic motivation as specific to certain activity-contents. The theory specifies four antecedents, which are supposed to increase intrinsic motivation through the fusion of an activity with its goal. The consequences of fusion shape the experience of intrinsically motivated activities, which was operationalized as activity enjoyment, low boredom, and voluntary persistence in the present thesis.

IMPLICATIONS OF INVESTIGATING INDIVIDUAL DIFFERENCES IN THE EXPERIENCE OF INTRINSIC MOTIVATION FOR THEORY AND PRACTICE

As mentioned in the beginning of the introduction, the extent to which persons generally experience intrinsic motivation during activities has important implications for selecting, initiating, maintaining, and succeeding in behaviors. Because intrinsically motivated activities are experienced as pleasant and perceived as instrumental *in the moment*, persons also see them as freely initiated (e.g., Kruglanski, 1975), are more committed to them (Kruglanski, Pierro, & Sheveland, 2011), and persist longer (e.g., Woolley & Fishbach, 2016). Intrinsic motivation furthermore promotes many positive outcomes, such as creativity (Hennessey & Amabile, 1998; Zhang & Bartol, 2010), learning (Cordova & Lepper, 1996), work engagement and satisfaction (Deci, Ryan, Gagné, Leone, Usunov, & Kornazheva, 2001; Ilardi, Leone, Kasser, & Ryan, 1993), effort and goal attainment (Lawler & Hall, 1970; Sheldon & Elliot, 1998), self-esteem (Ilardi et al., 1993; Murphy & Roopchand, 2003), and psychological health and well-being (Ilardi et al., 1993; Rivkin, Diestel, & Schmidt, 2016). These benefits should contribute to people's long-

term goal success and, in turn (e.g., Amabile & Kramer, 2011; Brunstein, 1993), increase their subjective well-being.

Because of these many immediate and long-term benefits, being able to predict intrinsic motivation in any given activity by knowing a person's propensity to experience intrinsic motivation in general would be very valuable. Psychological scientists could investigate, how such a propensity would develop, if and how it could be trained, and what its underlying processes and boundary conditions would be. Once better understood, the knowledge of individual differences in the propensity to experience intrinsic motivation could be useful in applied settings, where predicting intrinsic motivation (e.g., in personnel selection) and fostering intrinsic motivation (e.g., in school settings) are of central interest (Ames, 1992; Cordova & Lepper, 1996; Heyman & Dweck 1992; Krause, 2017; Kusurkar, Croiset, & Ten Cate, 2011).

Investigating such individual differences could also contribute to resolving the two fundamental controversies in intrinsic motivation research discussed above: The definition of intrinsic motivation (content-specific vs. structural) and its relation to extrinsic motivation (antagonistic vs. compatible; categories vs. continuum). If study participants in the present thesis were to show various levels of intrinsic motivation in the primarily extrinsically motivated activities they were asked to perform (i.e., assigned experimental tasks for course credit or money and activities during goal pursuit), then this would be more consistent with a content-free, structural definition of intrinsic motivation (Heckhausen, 1989; Kruglanski et al., 2018; Rheinberg & Engeser, 2018). Furthermore, it would add to the growing evidence that intrinsic and extrinsic motivations can co-occur and hence are not antagonistic, but might lie on a continuum (Kruglanski et al., 2018; Lepper & Henderlong, 2000).

The present thesis could also contribute to theory building by pointing to the relevance of individual differences in intrinsic motivation research. As outlined above, neither SDT's basic need theory (Deci & Ryan, 2000) nor the means-ends fusion theory (Kruglanski et al., 2018) consider stable individual differences in the experience of intrinsic motivation. According to basic need theory, intrinsic motivation is a function of activity contents and situational factors that facilitate its experience through the satisfaction of basic psychological needs. Basic needs are considered universal and mostly invariant between individuals (Deci & Ryan, 2000),

thus individuals are assumed to be more or less equally prone to experiencing intrinsic motivation. According to means-ends fusion theory, the experience of intrinsic motivation is a function of the structural relations between goals and activities, which are highly specific to a person's goals and the activities chosen to pursue them. Again, individuals should thus be more or less equally prone to experiencing intrinsic motivation. Depending on the results of the present thesis, I could identify an established trait, like positive affectivity, implicit motives, or emotion regulation, which could improve the prediction of the momentary experience of intrinsic motivation (see section below). Alternatively, a direct measure, such as developed in the present thesis, might be more useful than the mentioned established traits. Either way, positive results regarding individual differences in the experience of intrinsic motivation would suggest that current theories would benefit from considering such individual differences.

Indeed, such a development, namely that a newly introduced individual difference construct improved theorizing in a field that had previously overlooked such a possibility, took place in attitude research. Up to that development, researchers have investigated attitudes exclusively as a function of the evaluated stimuli (Fazio, 2007). Then, Hepler and Albarracin (2013) proposed individual differences in the propensity to have more positive or negative attitudes towards objects in general and introduced the Dispositional Attitude Measures (DAM) to measure these differences. The scale had good psychometric properties, correlated in theorized ways with its nomological net, and predicted the attitudes toward novel stimuli incrementally over and above established traits. In principle, the present thesis follows the same empirical approach by exploring theorized individual differences on a newly designed scale and examining the scales construct validity in terms of psychometric properties, nomological net, and predictive (and incremental) validities. Before detailing how I implemented those steps in the present thesis, I describe in the next two sections, why individual differences in the experience of intrinsic motivation are theoretically plausible and how individual difference constructs explicitly related to intrinsic motivation have neglected differences in the general experience of it.

ESTABLISHED TRAITS SUGGEST STABLE INDIVIDUAL DIFFERENCES IN THE EXPERIENCE OF INTRINSIC MOTIVATION

There are various established traits that have been linked to how frequently and intensely people experience positive feelings and/or how much they enjoy certain activities. These traits suggest that individuals also differ in their propensities to generally experience intrinsic motivation during activities, but these traits have rarely been studied from this perspective. They might (jointly) account for individual differences in how people experience activities, or represent lower-order factors that contribute to a higher order factor of such individual differences. There might also be, however, unique variance that only a direct measure of individual differences in experiencing intrinsic motivation may account for. In the present thesis, I test how well established traits predicted momentary intrinsic motivation, and if such a direct measure could incrementally predict intrinsic motivation over and above established traits.

First, there are stable individual differences in how much positive affect people experience in general (Carver & White, 1994; Diener, Larsen, Levine, & Emmons, 1985; Watson, Clark, & Tellegen, 1988). Positive affectivity shows considerable overlap with the Big Five personality trait extraversion (McCrae & Costa, 1997; Watson & Clark, 1997), which is why I discuss them jointly. Extraverts describe themselves as more enthusiastic, energetic, and active, and they report more positive moods and emotions (e.g., Costa & McCrae, 1980; Shiota, Keltner, & John, 2006). These stable differences in positive affectivity and extraversion may result from and/or lead to differences in how activities are experienced: On the one hand, differences in positive affectivity and extraversion can stem from differences in how people perceive activities (e.g., Oerlemans & Bakker, 2014). On the other hand, persons, who generally feel good, might attribute their positive affect to the activities they engage in and therefore perceive them as relatively more enjoyable than persons, who feel good less often (e.g., Martin, Ward, Achee, & Wyer, 1993). Accordingly, individual differences in positive affectivity and extraversion suggest individual differences in experiencing intrinsic motivation and should be positively related to them.

Second, there are individual differences in implicit motives, which "represent capacities to experience particular types of [dis-]incentives as pleasurable or aversive" (Rawolle, Schultheiss, & Schultheiss, 2013, p. 1). Incentives in this context are characteristics of activities and their contexts that signal a person that he or she can satisfy an implicit motive, which is intrinsically rewarding (McClelland et al., 1989; Stanton, Hall, & Schultheiss, 2010). Accordingly, disincentives are such characteristics that signal that motive satisfaction may be impeded (Schultheiss & Hale, 2007; Schultheiss, Pang, Torges, Wirth, & Treynor, 2005; Schultheiss, Wirth, Waugh, Stanton, Meier, & Reuter-Lorenz, 2008). The three most commonly studied implicit motives are the needs for achievement (McClelland, Atkinson, Clark, & Lowell, 1953), affiliation (Atkinson, Heyns, & Veroff, 1954), and power (Veroff, 1957; Winter, 1973), which can be understood as affective amplifiers that increase the pleasure from motive-congruent incentives, but also displeasure from disincentives (Schultheiss, 2008). For example, persons with high (vs. low) implicit achievement motives enjoy moderately to highly difficult activities more (McClelland, 1987), because this amount of difficulty is an achievement-congruent incentive. At the same time, they would be more bored during easy activities, because this amount of difficulty is a disincentive for them. Based on this theorizing, having several high implicit motives should enable persons to derive pleasure from various activities, but at the same time make them vulnerable to displeasure from disincentives (Schultheiss, Jones, Davis, & Kley, 2008). Thus, depending on the ratio of incentives to disincentives in persons' activities—for example, among others, the ratio of activities with moderate-to-high vs. low difficulty for achievement motivated persons—individual differences in implicit motives and in experiencing intrinsic motivation could be positively or negatively related. Irrespective if this ratio is positive or negative for most people, implicit motive theory suggests individual differences in experiencing intrinsic motivation in one direction or the other.

Third, differences in experiencing intrinsic motivation might also be related to differences in how well one can down-regulate negative emotions (e.g., Gross & John, 2003; Kuhl, 1990) and up-regulate positive emotions (e.g., Kuhl, 1990; Livingstone & Srivastava, 2012). Individuals engage in emotion regulation for hedonic reasons, that is, to influence their experiences of pain and pleasure, and for instrumental reasons,

like increasing their performance (Tamir, 2016). Both reasons suggest that persons would try to regulate their experience during activities in general, but particularly during unpleasant, yet important activities. Whether a person would ultimately enjoy these activities more or less than other people, should depend on the success of these emotion regulation attempts.

In sum, individual differences in positive affectivity, implicit motives, and emotion regulation ability suggest that individuals also differ in how much they experience intrinsic motivation during activities, even though neither of these traits has been introduced as an individual difference construct related to intrinsic motivation. In the following section, I discuss traits that *have* been introduced as such constructs.

INDIVIDUAL DIFFERENCE CONSTRUCTS EXPLICITLY RELATED TO INTRINSIC MOTIVATION

Two lines of research have explicitly put forth individual differences related to intrinsic motivation. The first one deals with individual differences in the extent to which intrinsic motivation is a *reason* for engaging in activities. The second one deals with individual differences in the propensity to experience *flow*, a specific state of intrinsic motivation.

First, several research groups have designed scales to measure individual differences in what Amabile and colleagues (1994, p. 950) called "motivational orientations" (Amabile et al., 1994; Guay et al., 2003; Rheinberg et al., 1997). Exemplary for this approach, Guay and colleagues (2003) designed the Global Motivation Scale (GMS-28) to measure the extent to which motivational characteristics that are intrinsic and/or extrinsic to the activities are reasons why respondents generally engage in them. A content-specific definition of intrinsic motivation underlies the GMS-28, which was developed within the SDT framework. Accordingly, there are three subscales related to trait-level intrinsic motivation, which address the general motivations (1) to know, (2) towards accomplishment, and (3) to experience stimulation. Another motivational orientation measure, but deploying a structural definition of intrinsic motivation, is the Incentive Focus Scale

(IFS; Rheinberg et al., 1997). Its *activity-incentive focus* subscale aims to measure the extent to which persons generally value activity-intrinsic incentives when engaging in activities.

The main limitation of the measures from this approach regarding the present thesis is that they mostly assess how much people value intrinsic motivation as a reason for engaging in activities, but not how much people enjoy activities regardless of the reasons for engagement. This connects back to the two aspects of intrinsic motivation that can be differentiated, namely its motivational core and the resulting experience. Measures of motivational orientations tap into the first but not the second aspect of intrinsic motivation. They only measure, for example, if a person usually paints, because he or she enjoys it (= activity-intrinsic reason for behavior), but they do not measure, if a person would tend to enjoy painting (= intrinsically motivated experience of behavior), regardless of doing it for reasons intrinsic or extrinsic to painting.

Second, Csikszentmihalyi (1975/2000) introduced the idea of an autotelic personality. People with such a personality are thought to possess a set of metaskills (e.g., general curiosity, persistence, and low self-centeredness) that make them more prone to experiencing flow. Flow is a special case of an intrinsically motivated state, where a person is absorbed in an activity, is intensely focused on the present actions, and loses self-consciousness (for a complete list of flow criteria, see Csikszentmihalyi, 1990). According to Csikszentmihalyi (1997), the autotelic personality is best measured via ambulatory assessment as how frequently a person is in situations that provide the conditions for flow. Some authors additionally include the experience of intrinsic motivation in their operationalization (e.g., Abuhamdeh, 2000). In a different approach, the Dispositional Flow Scale (Jackson & Eklund, 2002) measures the self-reported frequency of flow regarding one activity. The only self-report measure I am aware of that assesses flow frequency in activities in general, is a single-item measure used in demoscopic surveys in Germany (Allensbacher Markt- und Werbeträgeranalyse, 1995–2000). These measures of the autotelic personality directly address individual differences in experiencing intrinsic motivation, but they are limited in that they only target flow, not intrinsically motivated states in general. It is possible that the meta-skills behind the autotelic personality also facilitate

experiences of intrinsically motivated states outside of flow, but, to my knowledge, this has not been tested yet. I will provide a first, very preliminary exploration of this idea in the nomological net, where I will inspect the correlation of the above mentioned single-item measure of autotelic personality (Allensbacher Markt- und Werbeträgeranalyse, 1995–2000) with the newly designed measure for the tendency to generally experience intrinsic motivation.

THE PRESENT THESIS

Prior research on intrinsic motivation has predominantly focused on activity contents and situational factors that allow people to experience this pleasant and beneficial state. Yet, as outlined above, various established traits suggest that individuals differ in their general tendency to experience intrinsic motivation, regardless of activity contents or situational factors. This idea is also consistent with a content-free, structural approach to intrinsic motivation, as recently advanced in the means-ends fusion theory. While there are individual difference constructs explicitly related to intrinsic motivation, they have either focused on intrinsic motivation as a reason to engage in behavior or, when they actually conceptualized individual differences in the experience of intrinsic motivation, focused on a specific state of intrinsic motivation, namely flow. Therefore, an individual difference construct explicitly related to the *general experience* of intrinsic motivation during activities is lacking. To fill this gap, I aimed to answer these two primary research questions: (1) Are there stable individual differences in the tendency to experience intrinsic motivation during activities in general and (2) if so, do these differences predict momentary intrinsic motivation in a variety of concrete activities?

Research question 1: Are there stable individual differences in the tendency to experience intrinsic motivation during activities in general? To explore the possibility of individual differences in the experience of intrinsic motivation, I included five deductively obtained self-report items in an otherwise unrelated study (the Pilot Study). I chose self-report as the method of assessment, because evidence from multiple sources points to a reasonable accuracy, with which

respondents can rate their own characteristics (Vazire & Carlson, 2010). Furthermore, self-report has long been one of the standard methods in personality assessment; there are sophisticated and established methods to evaluate the reliability and validity of a scale (Cronbach & Meehl, 1955; Kane, 2001; Messick, 1995; Moosbrugger & Kelava, 2007); and it is a very ecological method with low participant burden, which makes it comparably ethical and practical (Lingler, Schmidt, Gentry, Hu, & Terhorst, 2014; Moosbrugger & Kelava, 2007).

The items were designed to measure the extent to which respondents experienced themselves as able to take pleasure in activities in general, even in boring ones and in imposed duties. I avoided items that referred to specific activity contents, interest domains, or the satisfaction of psychological needs in order to capture the tendency to experience intrinsic motivation independently of such factors. In contrast to measures of trait motivational orientations like the GMS-28, which measure the activity-intrinsic and -extrinsic reasons for generally engaging in activities, the items were designed to measure the general activity-intrinsic experience during activities, regardless of the reasons for engagement. Unlike the GMS-28, which focusses on certain contents that might elicit intrinsic motivation (e.g., accomplishment), and self-report measures of the autotelic personality, which focus on a specific state of intrinsic motivation (i.e., flow), the TEIMS's items were designed to apply to all contents and qualities of intrinsically motivated activities.

The power considerations for the study, in which the items were included, aimed at recruiting 200 participants, which allowed me to explore the psychometric properties of the items with adequate statistical power; specifically, these were internal consistency (Cronbach, 1951; Guttman, 1945; Yurdugül, 2008), normality (Bulmer, 1979), and factor structure (Brown, 2015). The main research question of that study was related to the experience of boredom, so, with this, the study included a dependent measure of momentary intrinsic motivation (Touré-Tillery & Fishbach, 2014). This allowed me to explore the predictive validity of the items and to thereby start answering the second research question, too.

The five items deployed in the Pilot Study showed good psychometric properties and predicted low boredom, so they were the basis for the final measure to capture respondents' self-reported tendencies to experience intrinsic motivation: The Trait

Experience of Intrinsic Motivation Scale (TEIMS). I therefore, from now on, refer to the five items used in the Pilot Study as the initial TEIMS version.

In Study 1, I combined six samples to thoroughly examine the psychometric properties and a wide nomological net of the TEIMS. In addition to examining internal consistency, normality, and factor structure, like for the initial TEIMS version, I also examined the final TEIMS's test-retest reliabilities over 1 and 4 months and measurement invariance regarding gender and time. Combining the samples allowed me to increase the statistical power for the confirmatory factor analysis (CFA; Brown, 2015) and get more reliable estimators in the nomological net (Schönbrodt & Perugini, 2013).

I attempted to build a nomological net as extensive as possible (47 measures) to make sure that the TEIMS was not redundant with any relevant existing measures. The nomological net included measures of all constructs discussed in the introduction (psychological need satisfaction, positive affectivity, extraversion, implicit motives, emotion regulation ability, motivational orientations, the autotelic personality, and dispositional attitudes) as well as measures related to behavioral inhibition and activation (BIS/BAS; Gray, 1970), life satisfaction (Diener, Emmons, Larsen, & Griffin, 1985), trait mindfulness (Brown & Ryan, 2003), the Big Five (McCrae, & Costa, 1987), playfulness (Proyer, 2012), self-regulatory capacity (Duckworth, Peterson, Matthews, & Kelly, 2007; Kuhl & Fuhrmann, 2004; Tangney, Baumeister, & Boone, 2004), and explicit motives (Schönbrodt & Gerstenberg, 2012). As I am not aware of any previous conceptualizations and measures of the trait experience of intrinsic motivation, I could not assess convergent validity in the strict sense and regarded all these measures to demonstrate discriminant validity. Therefore, I expected small to moderate correlations (if any) between the TEIMS and these constructs.

The original TEIMS was developed and validated in German. To make the TEIMS available to a wider scientific audience and encourage cross-cultural research with it, I started validating an English version of the TEIMS in Study A1 (see Appendix A). To this end, I included a translation of the TEIMS in an otherwise unrelated study. This study included measures of several personality and self-

regulatory traits, so I could assess parts of the nomological net, in addition to looking at internal consistency, normality, and factor structure.

In sum, based on prior theorizing, I expected that individuals would differ regarding their general tendencies to experience intrinsic motivation and that they could self-report such tendencies reasonably well on the TEIMS. I expected the TEIMS to have an internally consistent single-factor structure with nearly normally distributed scores and high stability over at least several months. The TEIMS should also be measurement invariant across genders and time points. Finally, it should show small to moderate correlations with a variety of theoretically relevant constructs, but should not be redundant with any of them.

Research question 2: Do individual differences in the tendency to experience intrinsic motivation predict momentary intrinsic motivation in a variety of concrete activities? To answer the second research question, I tested in Studies 2 through 6, if the TEIMS predicted, across a wide range of activities, indicators of momentary intrinsic motivation, such as activity enjoyment, low boredom, and voluntary persistence in a free-choice paradigm (Touré-Tillery & Fishbach, 2014).

Specifically, in Study 2, I tested if the TEIMS would predict how much individuals enjoyed working on different tasks of a psychological study and how much they enjoyed 30 diverse activities that were presented in vignettes. This study was a correlational online study and consisted of three parts, each with its own contents. In addition to the enjoyment ratings of the 30 vignette activities, the three enjoyment ratings after every study parts gave a rich image of the predictive validity of the TEIMS regarding various activities. Additionally, utilizing repeated measures in this manner not only increases statistical power by making person variance separable from error variance (Rasch, Friese, Hofmann, & Naumann, 2014), but also renders studies more informative while reducing participant burden (Lingler et al., 2014). I hypothesized that the TEIMS would positively predict self-reported enjoyment of the vignette activities and the three study parts.

In Study 3, I tested if the TEIMS predicted how much participants enjoyed a goal-directed activity in their day-to-day lives outside of the lab. I deployed the, compared to the methods used in Study 2, more rigorous method of ambulatory assessment to repeatedly measure over the course of 1 month how much participants enjoyed their gym exercise in the service of a self-set goal (e.g., losing weight or reducing back pain). Study 3 had several advantages compared to Study 2: First and foremost, it had larger external validity due to the context of day-to-day goal pursuit outside of the lab compared to the more artificial lab activities; second, it made even greater use of repeated measures with, on average 6.5 exercise session per person (*SD* = 3.4; range from 1 to 18); demand characteristics (Orne, 1962) were even less likely than in Study 2, because the time that had passed between filling out the TEIMS (among many other personality, self-regulatory, and sports-/health-related scales) and rating one's current exercise enjoyment spanned up to a month. Study 3 was conducted in a larger project on self-regulation strategies and enjoyment during goal-pursuit. This is why there were three different conditions with instructions unrelated to the present thesis (but detailed in the according methods section). I expected the TEIMS to positively predict exercise enjoyment (equally well) in all three conditions.

In Studies 4 through 6, I tested if the TEIMS predicted reduced boredom and voluntary persistence in two different experimental tasks. To rule out that associations between the TEIMS and the momentary experiences of intrinsic motivation during activities were due to common response tendencies in the used self-report measures, I aimed to replicate the findings from Studies 2 and 3 with a behavioral indicator of intrinsic motivation. Voluntary persistence is considered the gold standard for operationalizing intrinsic motivation (e.g., Deci, 1971; Lepper et al., 1973; Touré-Tillery & Fishbach, 2014), because it does not rely on self-report and addresses intrinsic motivation in the literal sense (Heckhausen, 1989; Kruglanski et al., 2018; Rheinberg & Engeser, 2018; Ryan & Deci, 2000b). To internally replicate findings within these studies, I additionally operationalized intrinsic motivation as low boredom. The two experimental tasks were the newly designed *picture-word matching task* (Study 4) and a memory task (Studies 5 and 6). They are further

examples of extrinsically motivated activities, which may vary in intrinsic motivation and for which the TEIMS may predict persistence and boredom.

To summarize the findings on the TEIMS's predictive validity from the six studies and three indicators of intrinsic motivation (Pilot Study and Studies 2 through 6), I conducted three local meta-analyses, one for each indicator. These meta-analyses inform about the average effect sizes with which the TEIMS predicts the different indicators of intrinsic motivation and if, overall, these effects are statistically significantly different from zero.

Secondary aims of the present thesis: The TEIMS's incremental validity, predictive validity of established traits regarding momentary intrinsic motivation, and possible processes underlying the TEIMS. The present thesis had three secondary aims. First, I set out to test whether the TEIMS would have incremental validity over well-established traits that, despite being possible contributors to momentary intrinsic motivation, have rarely been directly associated with this outcome. These traits were positive affectivity (Studies 2 through 6), implicit motives (Studies 2 and 3), and emotion regulation ability (Studies 2 through 6). Second, while establishing the incremental validity of the TEIMS, I was also able to explore how well these established traits predicted momentary intrinsic motivation. I did not include extraversion in these analyses, because its aspect of interest would have been its positive affective core, which was already directly addressed by trait positive affectivity.

Third, I took first steps to explore the processes underlying the TEIMS by considering differences in how well it predicted intrinsic motivation as a function of activity aversiveness. Depending on the presence or absence of an interaction with activity aversiveness, I would draw different conclusions on what kind of processes might underlie the TEIMS. If self-regulatory processes were to underlie the TEIMS, it should predict intrinsic motivation especially well in more aversive activities, because during such activities an (implicit or explicit) up-regulation of one's intrinsic experience would be more instrumental and therefore more likely to operate (Sansone, Weir, Harpster, & Morgan, 1992; Trope & Fishbach, 2000; see also Converse, Juarez, & Hennecke, 2018).

If, however, non-regulatory processes, like an amplified sensitivity and/or spontaneous responsiveness to incentives in activities (Schultheiss, 2008; Watson et al., 1988), were to underlie the TEIMS, it should predict momentary intrinsic motivation regardless of activity aversiveness. Persons with higher (vs. lower) TEIMS would then find more incentives across the whole spectrum of activity aversiveness and, in turn, react more positively to them. They would, for example, not only be more sensitive and/or reactive to the positive aspects of having a good friend present when sorely needed during an aversive activity, like getting a painful tattoo, but also during an enjoyable activity, like eating ice cream. I tested if regulatory or non-regulatory processes might underlie the TEIMS in the Pilot Study and Studies 4 through 6, where activity aversiveness was manipulated between conditions. Based on this reasoning, I tested if the TEIMS was a better predictor of momentary intrinsic motivation in more aversive activities. If so, self-regulatory processes might underlie the individual differences measured by the TEIMS.

Ethics and Open Science statements. Procedures in all studies conformed to the standards of the ethics committee of the University of Zurich Department of Psychology or were directly approved by it. For reasons of transparency (Simmons, Nelson, & Simonsohn, 2012), I report all experimental manipulations, sample size considerations, and data exclusions (if any) in the main body of the present thesis, as well as all measures in the Supplemental Online Materials of the journal article that is based on the reported data (Czikmantori, Hennecke, & Brandstätter, 2018). I report all relevant studies conducted and analyzed at the point of this writing, so there is no study file drawer (Rosenthal, 1979).

PILOT STUDY

EXPLORING THE PSYCHOMETRIC PROPERTIES AND PREDICTIVE VALIDITY OF AN INITIAL TEIMS VERSION

The purpose of the Pilot Study was to explore individual differences in generally experiencing intrinsic motivation. To this end, I constructed an initial version of the TEIMS and explored its psychometric properties and predictive validity in an otherwise unrelated study, ostensibly about piloting audio material. I manipulated boredom between-subject by the content that participants had to listen to, which was shown to be an effective manipulation in previous research (Markey, Chin, Vanepps, & Loewenstein, 2014). I predicted that this early TEIMS version would predict reduced boredom during listening. I also tested if the TEIMS interacted with activity aversiveness in predicting reduced boredom: As elaborated in the introduction, if the TEIMS was based on regulatory processes, it should predict reduced boredom especially well in the boring-audio condition. If not, it should predict boredom equally well in both conditions.

METHODS

Participants and procedure. The study was part of a larger project on self-regulatory strategies and the exploration of the initial TEIMS items was a secondary aim. Our research team recruited participants at a large Swiss university and aimed at an $N = 200$ based on power considerations for the main research question of the

strategy project. Fourteen participants had been excluded prior to data analysis due to the following reasons: Previous participation in a pilot study testing the same study materials (one person), technical issues (four persons), self-reported difficulties understanding the instructions (two persons), and missing values on all TEIMS items (seven persons) The final sample consisted of 217 individuals (see Table 1, Sample A, for sample descriptives and participant compensation). I used a one-factorial between-subjects design with two groups (boring-audio vs. interesting-audio). Participants were randomly assigned to conditions.

Participants should rate audio material for an ostensible future study. Each participant listened to six minutes of either a boring audio (lecture on previous professors who had taught at the department for classical philology at a German university) or an interesting audio (lecture on how infants find their feet), both given by male speakers. Materials were pre-tested in a small pilot sample (N = 29) to ensure they were able to manipulate boredom between persons. The difference in reported boredom between the boring-audio (M = 4.02, SD = 1.09) and the interesting-audio (M = 3.38, SD = 1.60) conditions was not significant, $t(27) = 1.20$, $p = .241$, but as the moderate effect (d = 0.47) would have been significant in a larger sample, I decided to use these audio stimuli.

Groups of up to three participants could take part in the study simultaneously. The study computers were arranged on three individual tables in a triangle, so participants could not see the other participants during the study. After giving informed consent, participants read a brief introduction about the ostensible study goals, then they calibrated the volume of their headphones to a subjectively pleasant level, and started listening to one of the audios while looking at a fixation cross on the computer screen. They then performed a lexical decision task irrelevant to the present thesis and rated their boredom regarding listening to the audio. Participants filled out some additional measures irrelevant to the present thesis and were thanked, reimbursed, and dismissed. As a final procedural step, participants filled out several self-report measures (including the initial version of the TEIMS) online outside the lab before being debriefed about the study purpose.

Table 1
Sample Characteristics and Participant Compensations in all Samples (Pilot Study and Study 1)

	Sample						
Variable	A	B	C	D	E	F	G
Studies, in which samples were used	Pilot	1, 3	1	1, 2	1, 4	1, 5	1, 6
N [a]	217	212	202	162	211	80	130
Age							
M	25.80	29.72	29.97	22.31	23.07	28.16	22.31
(*SD*)	(5.99)	(11.62)	(11.59)	(4.18)	(5.67)	(11.78)	(4.24)
Range	18–54	18–67	18–74	18–42	18–49	19–60	18–41
% women	74	73	76	82	79	73	75
% students	91	59	85	92	99	71	95
% German mother tongue	84	—[b]	90	88	88	86	87
Education							
% A-levels/High school	46	37	43	86	85	62	90
% University degree	44	40	34	8	11	23	9
% Other	10	23	23	7	4	15	2
Compensation	20 Swiss Francs	60 Swiss Francs	Various[c]	Course credit	Course credit	Course credit	Course credit

[a] Sample sizes are based on all participants with data on the TEIMS; for amount of participants previously excluded due to missing values on all TEIMS items, see the methods sections of the respective studies; further participant exclusions may have occurred for the hypothesis tests in Studies 2 through 6 and are described in the methods sections of the respective studies.
[b] German skills were assessed in telephone pre-screenings as a necessary requirement for study participation.
[c] Psychology students received course credit, other participants took part in a raffle to win a book voucher (10 Swiss Francs); additionally 2 Swiss Francs were donated to a charity organization for each participant. One Swiss Franc equals roughly $1.

Measures.

Trait experience of intrinsic motivation. I designed five items to measure the trait experience of intrinsic motivation (see Table 2 for exact wordings). With these items, participants indicated the extent to which they experienced that (even boring or obligatory) activities became more enjoyable with time, that they were able to take pleasure in them, and that they were rarely bored. I avoided items that referred to specific activity domains, activity contents, or the satisfaction of specific needs or interests in order to capture the tendency to experience intrinsic motivation independently of such factors. All items were answered on a discrete, bipolar 7-point scale with combined numeric and verbal scale anchors that marked every step (Moosbrugger & Kelava, 2007). Specifically, the scale anchors were 1 = *does not*

apply at all, 2 = *does mostly not apply*, 3 = *does rather not apply*, 4 = *neutral*, 5 = *rather applies*, 6 = *mostly applies*, and 7 = *applies very much*.

Boredom during listening to audio. Participants rated their boredom with five items of the Multidimensional State Boredom Scale (MSBS; Fahlman, Mercer-Lynn, Flora, & Eastwood, 2013) that were administered shortly after the audio finished. The MSBS has 29 items in four subscales. To reduce subject burden, I picked five relevant items out of the seven items that were used for a short version (Markey et al., 2014). These items were "Time was passing by slower than usual," "I was stuck in a situation that I felt was irrelevant," "I felt bored," "I seemed to be forced to do things that have no value to me," "I wished I were doing something more exciting." Items were answered on a 7-point Likert-type scale ranging from 1 to 7 (1 = *strongly disagree*; 7 = s*trongly agree*). Internal consistency of the combined scale was good ($\alpha = .89$).

RESULTS AND DISCUSSION

The five items of the initial TEIMS showed good internal consistency, Cronbach's $\alpha = .80$, so I calculated an average score ($M = 4.55$, $SD = 1.04$). Non-significant skewness (−0.18, $SE = 0.17$) and kurtosis (−0.16, $SE = 0.33$) indicated adequate normality.

I conducted a CFA using Mplus 7 (Muthén & Muthén, 1998–2012) to test the hypothesized one-factor structure. As items were answered on 7-point scales, I treated them as continuous variables (see Rhemtulla, Brosseau-Liard, & Savalei, 2012). I used robust maximum likelihood estimation (MLR), because perfect normality cannot be assumed with 7-point scales (Brown, 2015). Errors of items were not allowed to covary, even if modification indices suggested better fit, as I had no theoretical assumptions about such relationships. The metric of the latent variable was defined by the marker indicator approach (Brown, 2015): The loading of the theoretically most representative item (item 6 in Table 2) on the latent variable was fixed to 1. An unconditional one-factor model fit the data very well, $\chi^2(5) = 3.33$, RMSEA = 0.000, 90% CI [.000, .076], CFI = 1.00, TLI = 1.02. Standardized factor loadings of this one-factor model ranged from .43 to .84 (see Table 2).

Table 2
Standardized Item Factor Loadings and Intercepts of the TEIMS in the CFAs in the Pilot Study and Study 1

	Standardized factor loading (intercept)	
TEIMS item	Pilot Study	Study 1
1. In pretty much every situation, I find something that excites me.	0.74 (4.68)	0.71 (4.71)
2. If I have to carry out a boring task, with time, I find something in it that is fun to me.	0.70 (4.46)	0.77 (4.28)
3. If a duty is placed on me, I quickly find an aspect of the activity that appeals to me.	0.84 (4.46)	0.74 (4.51)
4. If an activity is no fun to me, this does not change, no matter how long I engage in it. (R)	—	0.48 (4.33)
5. There are very few situations, in which I would feel bored.	0.43 (4.08)	0.53 (4.07)
6. I can take pleasure in most activities I engage in.	0.70 (5.09)	0.66 (5.06)

Note. Original items were presented in German and are included in Appendix B. (R) = recoded before scale calculation; this item was not included in the initial version of the TEIMS.

To test whether the initial TEIMS would interact with activity aversiveness or not when predicting reduced boredom, I conducted a moderation analysis with the TEIMS, condition (0 = boring-audio, 1 = interesting-audio), and their interaction as predictors of boredom. I used the PROCESS tool for SPSS (Hayes, 2017). The overall model was significant, $F(3, 213) = 46.23$, $p < .001$, $R^2 = .37$. There was a main effect of the TEIMS on boredom, $b = -0.20$, 95% CI [−0.37, −0.03], $\beta = -.14$, $t = 2.31$, $p = .022$, indicating that participants higher in the trait experience of intrinsic motivation were less bored, regardless of condition. Additionally, there was a main effect of condition on boredom, $b = -1.74$, 95% CI [−2.06, −1.42], $\beta = -.59$, $t = -10.67$, $p < .001$, so participants in the boring-audio condition reported higher boredom than participants in the interesting-audio condition. Condition did not moderate the relationship between the TEIMS and boredom, $b = 0.20$, 95% CI [−0.15, −0.54], $\beta = -.07$, $t = 1.13$, $p = .261$.

In sum, the initial version of the TEIMS had good psychometric properties and predicted low boredom in the laboratory. Results of the moderation analysis were more consistent with the main effect than the interaction hypothesis of the TEIMS on boredom. This suggests that non-regulatory processes might underlie the TEIMS, because they would unfold their effects regardless of activity aversiveness.

STUDY 1

VALIDATING THE FINAL TEIMS VERSION

The purpose of Study 1 was to complete the construction and validation of the TEIMS. I examined item properties, internal consistency, normality, test-retest reliabilities over one and 4 months, factor structure, measurement invariance regarding gender and time, and the nomological net.

I attempted to build a nomological net as extensive as possible (47 measures) to make sure that the TEIMS was not redundant with any existing relevant measures. As I am not aware of any previous conceptualizations and measures of the trait experience of intrinsic motivation, I could not assess convergent validity in the strict sense and regarded all measures to demonstrate discriminant validity. For the same reason, I generally expected small to moderate correlations (if any) between the TEIMS and the constructs discussed below. I made an informed selection of constructs that I would expect to be positively, negatively, or not at all related to the TEIMS based on the theorizing in the introduction and in the following paragraphs. See Table 3 for all measures. For clarity, I present the constructs of the nomological net organized into four categories. These are "positive affectivity and life satisfaction," "emotion regulation," "personality and self-regulation," and "needs and attitudes."

First, "positive affectivity and life satisfaction" included explicit and implicit trait affectivities (Quirin, Kazen, & Kuhl, 2009; Watson et al., 1988), BIS/BAS (Gray, 1970), and life satisfaction (Diener et al., 1985). As elaborated in the introduction, individual differences in how often persons experience certain affect (trait affectivity) and differences in how they experience activities could mutually influence each other

Table 3

Nomological Net of the TEIMS: Variables, Example Items, Verbal Scale Anchors, Descriptive Statistics, Sample Sizes, and Correlations with the TEIMS (Study 1)

Variable[Sample(s)] (measure)	Example item	VA	α (number of items)	*M* (*SD*)	*N*	*r*
Positive affectivity and life satisfaction						
Pos. affectivity[B] (MDMQ)	content	Ext	.86 (4)	5.39 (1.09)	212	.39**
Trait vigilance[B] (MDMQ)	energetic	Ext	.79 (4)	4.34 (1.18)	212	.28**
Trait relaxation[B] (MDMQ)	restless	Ext	.81 (4)	4.61 (1.22)	212	.35**
Pos. affectivity[D–G] (PANAVA-KS)	energetic/weak (R)	Adj	.80 (4)	4.27 (1.07)	578	.45**
Neg. affectivity[D–G] (PANAVA-KS)	calm/nervous	Adj	.77 (4)	3.39 (1.10)	578	–.31**
Trait valence[D–G] (PANAVA-KS)	unhappy/happy	Adj	.85 (2)	5.30 (1.25)	578	.42**
Implicit pos. affectivity[G] (IPANAT)	cheerful[a]	Fit	.72 (3)	4.20 (0.62)	130	.26**
Implicit neg. affectivity[G] (IPANAT)	tense[a]	Fit	.71 (3)	3.38 (0.64)	130	–.17
BIS[F, G] (BIS/BAS Scales)	Criticism or scolding hurts me quite a bit.	Apl	.83 (7)	5.10 (0.98)	286	–.26**
BAS, drive[F, G] (BIS/BAS Scales)	When I want something I usually go all-out to get it.	Apl	.73 (4)	5.31 (0.77)	286	.25**
BAS, reward responsiveness[F, G] (BIS/BAS Scales)	When I get something I want, I feel excited and energized.	Apl	.60 (5)	5.71 (0.66)	286	.24**
BAS, fun seeking[F, G] (BIS/BAS Scales)	I will often do things for no other reason than that they might be fun.	Apl	.52 (4)	5.07 (0.79)	286	.19**
Life satisfaction[B–F] (SWLS)	I am satisfied with my life.	Agr	.87 (5)	5.17 (1.14)	991	.33**
Emotion regulation						
Reappraisal[B, D] (ERQ)	When I want to feel more positive emotion, I change the way I'm thinking about the situation.	Tru	.82 (6)	4.76 (0.96)	504	.44**
Suppression[B, D] (ERQ)	I control my emotions by not expressing them.	Tru	.77 (4)	3.66 (1.18)	504	–.08
Prospective AO[B–F] (HAKEMP 90)	—[b]	—	.79 (12)	5.03 (3.12)	992	.38**
Failure-rel. AO[B–F] (HAKEMP 90)	—[b]	—	.81 (12)	5.99 (3.33)	992	.32**
Trait mindfulness[D] (MAAS)	I notice how I do things without paying attention to them.	Fre	.74 (6[d])	4.56 (0.96)	162	.17*
Personality and self-regulation						
Neuroticism[B–G] (BFI-K)	I'm worried a lot.	Apl	.83 (4)	4.16 (1.32)	997	–.32**
Extraversion[B–G] (BFI-K)	I'm outgoing and sociable.	Apl	.86 (4)	4.71 (1.29)	997	.25**
Openness to experience[B–G] (BFI-K)	I am very interested in everything.	Apl	.76 (5)	5.37 (1.06)	997	.29**
Agreeableness[B–G] (BFI-K)	I tend to criticize others. (R)	Apl	.63 (4)	4.18 (1.05)	997	.36**
Conscientiousness[B–G] (BFI-K)	I make plans and do them too.	Apl	.75 (4)	4.96 (0.98)	997	.25**
Flow frequency [B, D–F]	—[c]	—	—	3.22 (0.67)	790	.20**
Playfulness[D] (SMAP)	I am a playful person.	Apl	.89 (5)	4.73 (1.13)	162	.31**
Trait self-control[B–C] (BSCS)	I am good at resisting temptation.	Apl	.85 (13)	4.16 (0.93)	414	.32**
Perseverance[B–C] (Grit Scale)	I am a hard worker.	Apl	.67 (6)	5.05 (0.84)	414	.41**
Self-motivation ability[B–G] (VCI)	I know how to motivate myself even when my endurance drops off.	Apl	.85 (4)	4.39 (1.11)	991	.58**
Needs and attitudes						
GIM, know[B, D–F] (GMS-28)	because I like making interesting discoveries.	Apl	.88 (4)	5.39 (0.98)	660	.43**
GIM, accomplish[B, D-F] (GMS-28)	because of the pleasure I feel outdoing myself.	Apl	.79 (4)	5.14 (0.96)	660	.26**
GIM, stimulation[B, D–F] (GMS-28)	in order to feel pleasant emotions.	Apl	.79 (4)	5.22 (0.91)	660	.27**
GEM, identified[B, D–F] (GMS-28)	in order to help myself become the person I aim to be.	Apl	.71 (4)	5.54 (0.82)	660	.20**
GEM, introjected[B, D–F] (GMS-28)	because I would beat myself up for not doing them.	Apl	.84 (4)	3.76 (1.32)	660	–.19**
GEM, external[B, D–F] (GMS-28)	in order to attain prestige.	Apl	.80 (4)	4.14 (1.23)	660	–.10*
Global amotivation[B, D–F] (GMS-28)	although I do not see the benefit in what I am doing.	Apl	.80 (4)	2.68 (1.06)	660	–.11**

Table 3 (*continued*)

Variable[Sample(s)] (measure)	Example item	VA	α (number of items)	*M* (*SD*)	*N*	*r*
Activity-incentive focus[B, D] (IFS)	I am pleased with a day, when I could devote myself to appealing activities.	Apl	.70 (10)	4.47 (0.7)	374	.13*
Goal-incentive focus[B, D] (IFS)	I am pleased with a day, when I could achieve important results.	Apl	.69 (10)	4.50 (0.74)	374	.06
nAch[B] (PSE)	—[e]	—	—	3.35 (1.80)	136	.05
nAff[B] (PSE)	—[e]	—	—	5.85 (2.68)	136	.06
nPow[B] (PSE)	—[e]	—	—	2.54 (1.74)	136	–.05
nAch[D] (PSE)	—[e]	—	—	4.41 (1.97)	160	.03
nAff[D] (PSE)	—[e]	—	—	7.52 (2.71)	160	.00
nPow[D] (PSE)	—[e]	—	—	4.11 (2.23)	160	–.18*
sanAch[B] (UMS)	Encounters with other people make me happy	A/I	.67 (3)	5.23 (0.94)	272	.30**
sanAff[B] (UMS)	Personally producing work of high quality	A/I	.83 (3)	5.09 (1.10)	143	.05
sanPow[B] (UMS)	I like to have the final say	A/I	.80 (3)	4.17 (1.26)	143	.14
Autonomy need satisf.[B] (PNSEG)	I feel free to exercise in my own way.	Apl	.67 (6)	5.22 (1.05)	185	.14
Competence need satisfaction[B] (PNSEG)	I feel confident I can do even the most challenging exercises.	Apl	.73 (6)	5.56 (0.85)	185	.15*
Relatedness need satisfaction[B] (PNSEG)	I feel connected to the people who I interact with while I exercise together.	Apl	.80 (6)	4.18 (1.32)	185	.01
Dispositional attitude[G] (DAM)	Japan	Fav	.69 (16)	4.14 (0.68)	130	.16

Note. Items were answered on 7-point scales, except for items of the HAKEMP 90 (theoretical range from 0 to 12, based on the sum of action-oriented responses) and the flow item (see below); higher values indicate larger manifestations; VA = verbal scale anchor. Abbreviations: Pos. = Positive; Neg. = Negative; AO = action orientation; rel. = related; GIM = Global intrinsic motivation; GEM = Global extrinsic motivation; nAch/nAff/nPow = implicit achievement, affiliation, and power motives; sanAch/sanAff/sanPow = explicit achievement, affiliation, and power motives; (R) = recoded before scale calculation.
Verbal scale anchors: Ext = extent (from "not at all" to "very"); Adj = adjectives at both ends; Fit = fit (from "does not fit at all" to "fits absolutely"); Apl = applicability (from "does not apply at all" to "absolutely applies"); Agr = agreement (from "do not agree at all" to "agree absolutely"); Tru = truth (from "not at all true" to "absolutely true"); Fre = Frequency (from "almost never" to "almost always"); A/I = applicability or importance, depending on item (from "does not apply at all" to "absolutely applies" or from "not at all important" to "very important"); Fav = (from "extremely unfavorable" to "extremely favorable").
Measure citations: MDMQ = Multidimensional Mood State Questionnaire (Steyer, Schwenkmezger, Notz, & Eid, 1997); PANAVA-KS = Short version of the Positive and Negative Affect Schedule (Watson et al., 1988; German version by Schallberger, 2005); IPANAT = Implicit Positive And Negative Affect Test (Quirin et al., 2009); BIS/BAS Scales (Carver & White, 1994; German version by Strobel, Beauducel, Debener, & Brocke, 2001); SWLS = Satisfaction With Life Scale (Diener et al., 1985; German version by Schumacher, Klaiberg, & Brähler, 2003); ERQ = Emotion Regulation Questionnaire (Gross & John, 2003; German version by Abler & Kessler, 2009); HAKEMP 90 = Action-Control Scale (Kuhl, 1994; German version by Kuhl, 1990); MAAS = Mindful Attention and Awareness Scale (Brown & Ryan, 2003; German version by Michalak, Heidenreich, Ströhle, & Nachtigall, 2008); BFI-K = Short Big Five Inventory (McCrae & Costa, 1987; German version by Rammstedt, & John, 2005); SMAP = Short Measure for Adult Playfulness (Proyer, 2012); BSCS = Brief Self-Control Scale (Tangney et al., 2004; German version by Bertrams & Dickhäuser, 2009); Grit Scale (Duckworth et al., 2007; own translation into German); VCI =

Volitional Components Inventory (Kuhl & Fuhrmann, 1998; German version by Kuhl & Fuhrmann, 2004); GMS-28 = Global Motivation Scale (Guay et al., 2003; own translation into German); IFS = Incentive Focus Scale (Rheinberg et al., 1997); PSE = Picture Story Exercise (McClelland et al., 1989); UMS = Unified Motive Scale (Schönbrodt & Gerstenberg, 2012); PNSEG = Psychological Need Satisfaction in Exercise Scale (Rackow, Scholz, & Hornung, 2013); DAM = Dispositional Attitude Measure (Hepler & Albarracín, 2013; own translation into German).
[a] Participants rated for six artificial words (e.g., "safme" or "tunba") how "cheerful," "helpless," "energetic," "tense," "happy," and "inhibited" they sounded to them.
[b] Items were dichotomous with each answer option being indicative of action orientation or state orientation. Scales scores reflect the sums of action-oriented responses.
[c] Participants answered the following question: "When carrying out an activity, one can be so absorbed in it, that everything else around becomes meaningless and one totally forgets the time. Do you know this?" The four answer options were "Yes, I experience this frequently," "Yes, I experience this from time to time," "Yes, I know this, but I experience it only rarely," and "No, I do not know this." I treated this item as a continuous variable.
[d] To reduce subject burden, I chose the scale's six items with the highest item-total correlations.
[e] The implicit motive measurement procedures are described in the running text.
* $p < .05$ ** $p < .01$

(Martin et al., 1993; Oerlemans & Bakker, 2014). Closely related to trait affectivity are the BIS/BAS, two dispositional motivational systems concerning inhibiting and facilitating behavior, respectively, and generating negative and positive affect, respectively. The BIS/BAS and trait affectivity are in fact so closely related that Elliot and Thrash (2002) found that they loaded on a single factor. Thus, I extend the arguments for links between affectivity and the TEIMS to the BIS/BAS. Life satisfaction is the cognitive aspect of subjective well-being and a person's rating of his or her quality of life (Shin & Johnson, 1978). I assumed that individuals, who generally experience intrinsic motivation during activities would consequently be more satisfied with their life. In sum, I expected positive relationships between the TEIMS and positive affectivity, BAS, and life satisfaction, and negative relationships with negative affectivity and BIS.

Second, "emotion regulation" included reappraisal and suppression (Gross & John, 2003), action orientation (Kuhl, 1990), and trait mindfulness (Brown & Ryan, 2003). In the introduction, I argued that differences in experiencing intrinsic motivation should be related to differences in how well a person can down-regulate negative emotions and up-regulate positive emotions. Two major approaches in

emotion regulation research have found that persons, who tend to use cognitive reappraisal (vs. expressive suppression) and/or are action (vs. state) oriented are more effective emotion regulators and experience more positive moods and emotions (Gross & John, 2003; Kuhl, 1994). Further, mindfulness, that is, being consciously aware of one's inner states and the surroundings in the present moment, is effective in reducing stress and negative emotions (Eberth & Sedlmeier, 2012). Through these benefits, trait mindfulness could contribute to experiencing more intrinsic motivation in general. In sum, I expected positive relationships between the TEIMS and reappraisal, action orientation, and trait mindfulness, and a negative relationship with suppression.

Third, "personality and self-regulation" included the Big Five personality traits (McCrae, & Costa, 1987), flow frequency in everyday life (Allensbacher Markt- und Werbeträgeranalyse, 1995–2000), playfulness (Proyer, 2012), trait self-control (Tangney et al., 2004), perseverance (Duckworth et al., 2007), and self-motivation ability (Kuhl & Fuhrmann, 2004). The Big Five encompass neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. Neuroticism and extraversion items load on the same factors as trait negative affectivity/BIS and positive affectivity/BAS, respectively (Elliot & Thrash, 2002), so I extended the according arguments from two paragraphs above to these personality traits. Openness showed links to experiencing emotions indicative of intrinsic motivation, for example, interest (Mitte & Kämpfe, 2008), joy, and awe (Shiota et al., 2006). Thereby, it could contribute to generally experiencing intrinsic motivation during activities. I had no expectations regarding agreeableness. Frequency of flow in everyday life was used as a proxy for the autotelic personality, which might predict not only the experience of flow, but also the experience of intrinsic motivation more generally. Playfulness can be defined as the disposition to (re-)frame situations in ways that entertains oneself and/or others (Barnett, 2007). Thus, if a person would tend to reframe activities in ways that would make them more entertaining to him- or herself, that person should generally experience more intrinsic motivation.

The self-regulatory traits conscientiousness, trait self-control, perseverance, and self-motivation ability show considerable conceptual and/or empirical overlap (Credé, Tynan, & Harms, 2017; Duckworth, et al., 2007), so I discuss them here

jointly. Conscientiousness is a broad factor of personality characterized by, among others, competence, self-discipline, and tenacity (Costa & McCrae, 1992; Denissen & Penke, 2008); trait self-control is the capacity to modulate one's behavior to support long-term goal pursuit (Baumeister, Vohs, & Tice, 2007); perseverance is the ability and tendency to persist in goal-directed behavior even during difficult times. (Duckworth, et al., 2007); and self-motivation is a person's ability to motivate oneself, when actions have become difficult, unpleasant, or boring (Kuhl & Fuhrmann, 2004). These definitions show that all these constructs support effective and persistent goal-pursuit and growth of competence, which also has been confirmed empirically (De Ridder Lensvelt-Mulders, Finkenauer, Stok, & Baumeister, 2012; Duckworth, et al., 2007; Fröhlich & Kuhl, 2003; Judge, Higgins, Thoresen, & Barrick, 1999; Ones, Viswesvaran, & Schmidt, 1993; Tross, Harper, Osher, & Kneidinger, 2000). Such benefits could make activities more intrinsically motivating through increased success (Amabile & Kramer, 2011) and competence (Bandura & Schunk, 1981; Schüler, Sheldon, & Fröhlich, 2010) or through allowing people to regulate the experience of their activities (Converse et al., 2018; Sansone et al., 1992). In sum, I expected positive relationships between the TEIMS and all measures in "personality and self-regulation," except for neuroticism, where I expected a negative relationship, and agreeableness, where I did not formulate expectations.

Fourth and lastly, "needs and attitudes" included two measures of so-called trait motivational orientations, namely global motivation (Guay et al., 2003) and incentive focus (Rheinberg et al., 1997), as well as implicit motives (Schultheiss & Brunstein, 2010), explicit motives (Schönbrodt & Gerstenberg, 2012), basic need satisfaction (Deci & Ryan, 2000), and dispositional attitudes (Hepler & Albarracin, 2013). Global motivation and incentive focus concern how much people value motivational characteristics that are intrinsic and extrinsic to the activities they engage in. I assumed that people, who value activity-intrinsic characteristics more, would more likely engage in intrinsically motivated activities and therefore experience intrinsic motivation more often. Valuing extrinsic rewards or generally being amotivated, however, should reduce the frequency of experiencing intrinsic motivation. As described in the introduction, pronounced implicit motives should

enable persons to derive pleasure from various activities, but also make them vulnerable to displeasure from disincentives. Thus, the relationship with generally experiencing intrinsic motivation should depend on the ratio of incentives to disincentives in persons' activities. As this ratio is unknown, we refrained from making predictions for implicit motives. Explicit motives are content classes of deliberate goals (e.g., achievement, affiliation, power). Persons, who feel directed by goals report higher well-being (Emmons, 1996), which might partly result from experiencing more intrinsic motivation. As described in the introduction, activities should generally be experienced as intrinsically motivating, if they allow persons to satisfy the needs for autonomy, competence, and/or relatedness (Deci & Ryan, 2000). The dispositional attitude refers to a person's tendency to like or dislike stimuli in general (Hepler & Albarracin, 2013), so a person with a positive dispositional attitude might enjoy activities more, because he or she might like the stimuli during activities more (e.g., activity contents, contextual details, etc.). In sum, I expected positive relationships between the TEIMS and all measures in "needs and attitudes," except for global extrinsic motivation/goal-incentive focus and amotivation, where I expected negative relationships.

METHODS

Participants. I combined six samples (B through G) to validate the final version of the TEIMS. Table 1 displays sample characteristics for each sample. Except for sample C, these samples were also used in Studies 2 through 6. The pooled sample size was $N = 997$ (77% students, 76% female, age: $M = 26.01$ years, $SD = 9.49$). I had previously excluded 73 participants due to missing values on all TEIMS items. The TEIMS was always administered before any manipulations had taken place in the respective studies. It was positioned in batteries of different measures either at the beginning or at the end of the respective studies. Samples did not differ in mean TEIMS scores, $F(5, 991) = 0.91$, $p = .472$, $\eta^2 = .005$. I therefore decided to combine the samples to increase the power for the CFA (Brown, 2015) and get more reliable estimators in the nomological net (Schönbrodt & Perugini, 2013). Participants in Sample B filled out the TEIMS a second time 1 and 4 months after baseline. In Studies 4 through 6, several variables of the nomological net were measured after the

manipulations in the respective studies. In those cases, I performed independent sample *t*-tests for the relevant variables between conditions. Less than 5% of those tests were significant and no variable systematically differed between conditions in more than one study. Hence, I included data from all mentioned variables from all studies in the examination of the nomological net.

Measures.

Trait experience of intrinsic motivation. In the Pilot Study, the five items of the initial TEIMS version had good psychometric properties and predicted reduced boredom in an experimental task, so they were the basis for the final version of the TEIMS. So far, all items had been positively phrased, so I added two negatively worded items to reduce acquiescence (Moosbrugger & Kelava, 2007). These items were "If an activity is no fun to me, this does not change, no matter how long I engage in it" and "I can take pleasure only in very few of the activities I engage in."

Measures of the nomological net. For brevity, all measures of the nomological net except implicit motives (which I describe in the following) are described in Table 3. The implicit achievement, affiliation, and power motives were measured with the PSE (McClelland, et al., 1989) in a sub-sample of Sample B and in Sample D. Participants worked on computerized online-versions of the PSE (Bernecker & Job, 2011) with the standard instructions outlined in Schultheiss and Pang (2007). The five pictures in Sample B were (in this order): *Girlfriends in café with male approaching*, *Bicycle race*, *Couple sitting opposite a woman*, *Soccer duel*, and *Nightclub scene*. In Sample D, the picture *Trapeze artists* was added lastly. After a technical error in one of the conditions in Sample B (see Study 3 procedures for details), only PSE data for the experimental and no-intervention conditions were coded (N = 136). The PSE is the gold standard in implicit motive measurement (Schultheiss & Brunstein, 2010) and requires participants to write imaginative stories to picture cues. Each Picture was displayed for 10 seconds, then participants had 4 minutes to write each story. A trained coder coded the motive imagery in the stories using Winter's (1994) coding system. Ten percent of the images were coded by a second trained coder. Inter-coder reliabilities were high (Sample B: .92 to .97; Sample D: .95 to .99). In sample B, PSE protocol length (M = 435 words, SD = 156)

was significantly correlated with participants' overall scores of implicit motives for achievement (M = 3.35, SD = 1.80), r = .51; affiliation (M = 5.85, SD = 2.68), r = .60; and power (M = 2.54, SD = 1.74), r = .39; all ps < .001. Also in sample D, PSE protocol length (M = 605 words, SD = 150) was significantly correlated with achievement (M = 4.41, SD = 1.97), r = .30; affiliation (M = 7.52, SD = 2.71), r = .53; and power motive scores (M = 4.11, SD = 2.23), r = .34; all ps < .001. Hence, I residualized and z-standardized motive scores in both samples. Cronbach's alphas are usually not reported for PSE picture cues, because it is not an appropriate measure of internal consistency for this measure (Schultheiss, Liening, & Schad, 2008).

RESULTS AND DISCUSSION

Item-selection and psychometric properties. One of the new negatively worded items ("I can take pleasure only in very few of the activities I engage in.") had a low item-total correlation of .31 and hence was dropped. Corrected item-total correlations for the final 6-item version of the TEIMS ranged from .44 to .62. Internal consistency was good, Cronbach's α and Guttman's λ_2 = .81, so items were averaged after recoding the reversely coded item (M = 4.49, SD = 0.93). Small skewness (–0.19, SE = 0.08)(see Bulmer, 1979) and non-significant kurtosis (–0.28, SE = 0.16) indicated adequate normality. Inter-item correlations ranged from .25 to .59 and the mean correlation after Fisher's z-transformation was r = .43, which is within the range suggested by Clark and Watson (1995). Test-retest reliabilities after 1 month (r = .66, p < .001, N = 184) and 4 months (r = .72, p < .001, N = 142) were high. In sum, the final TEIMS could retain its good psychometric properties in a larger sample with a negatively worded item added.

CFA. An unconditional one-factor model showed good fit, $\chi^2(9) = 37.64$, RMSEA = 0.056, 90% CI [.039, .076], CFI = 0.98, TLI = 0.96. Standardized factor loadings of this one-factor model ranged from .48 to .77 (see Table 2).

Measurement invariance. An important step in scale validation is measurement invariance testing, which tests if a measure has identical psychometric properties in different groups or time points (Meade, Johnson, & Braddy, 2008). When interpreting mean differences between groups or over time, an important precondition is that the structure and measure of the latent factor assessed by the scale is invariant (not significantly different) between groups (e.g., gender, cultures, etc.) or time points. I tested measurement invariance regarding gender and time points using a CFA-based approach (for detailed descriptions of this approach, see Little, 1997; Meredith, 1993; Millsap, 2011), which involves fitting several multi-group CFAs with successively introducing new restrictions in every model. First, *configural invariance* is given if the data can be modelled with the same number of factors measured by the same items in all groups. Second, *weak invariance* is given if the indicator loadings can be equated between groups. Third and finally, strong invariance is given if the indicator intercepts can be equated between groups.

Like in the CFAs reported above, I used Mplus 7 (Muthén & Muthén, 1998–2012) and the MLR estimator for these analyses. I used an analysis-specific alternative null model as basis for the calculation and reference of the relative fit indicators, because this model gives more accurate evaluations than the default null model in Mplus (Widaman & Thompson, 2003). The metric of the latent variable was again defined by the marker indicator approach (Brown, 2015) with the loading of item 6 on the latent variable fixed to 1. Model fit of the configural model was evaluated using the RMSEA, CFI, and McDonald (1989) noncentrality index (Mc). Note that I have replaced the TLI from the above CFAs with the Mc for the invariance testing based on a recommendation by Cheung and Rensvold (2002). Mc values above 0.90 indicate good model fit (Hu & Bentler, 1999). Based on further recommendations by Cheung and Rensvold (2002), weak and strong invariance, respectively, were assumed, when Δ CFI < .01.

Regarding gender. Based on the CFA above, I modelled a single factor measured by the six TEIMS indicators for the two groups of men and women. Model fit statistics are displayed in Table 4. The model showed acceptable fit regarding the RMSEA and good fit regarding the CFI and Mc, indicating configural invariance overall. To test for weak invariance, I then equated factor loadings across groups.

Table 4
Fit Statistics for Multi-group Models of the TEIMS Invariance Testing (Study 1)

Model	Samples	S-B χ^2	*df*	RMSEA	90% CI	CFI	Mc	Δ CFI
Gender								
Configural	B–G	58.04	18	0.067	[.048, .087]	0.974	0.980	
Weak	B–G	66.27	23	0.062	[.045, .079]	0.971	0.978	< 0.01
Strong	B–G	72.08	28	0.056	[.041, .073]	0.971	0.978	< 0.01
Time								
Configural	B	30.65	27	0.027	[.000, .067]	0.995	0.997	
Weak	B	40.56	37	0.023	[.000, .059]	0.995	0.997	< 0.01
Strong	B	63.70	47	0.045	[.000, .070]	0.978	0.985	0.017
Partial strong 1	B	56.67	45	0.038	[.000, .066]	0.985	0.989	0.011
Partial strong 2	B	50.85	43	0.032	[.000, .062]	0.990	0.993	< 0.01

Note. Invariance was assumed, when Δ CFI < .01 at each invariance step. Model "Partial strong 1," is identical to the "Strong" model, except that intercepts of item 3 were equated across time points. Model "Partial strong 2," is identical to the "Partial strong 1" model, except that intercepts of item 4 were additionally equated across time points.

This model fit similarly well and passed the Δ CFI < .01 criterion for weak invariance. To test for strong invariance, I then equated indicator intercepts across groups. This model showed good fit on all parameters and passed the Δ CFI < .01 criterion for strong invariance, which means that when group differences between men and women were to be found, they could be interpreted as differences in the latent variable.

Regarding time. I modelled a single factor measured by the six TEIMS indicators for the three measurement points in sample B. See Table 4 for model fit statistics. The model showed good fit regarding all parameters, indicating configural invariance. To test for weak invariance, I then equated factor loadings across groups. This model fit similarly well and passed the Δ CFI < .01 criterion for weak invariance. To test for strong invariance, I then equated indicator intercepts across groups. This model also showed good fit on all parameters, but did not pass the Δ CFI < .01 criterion for strong invariance (Δ CFI = .017). According to the modification indices, equating the intercepts of item three across time points decreased model fit most. Therefore, I fitted a model that allowed the intercept of item three to vary freely between time points, but was otherwise identical to the model testing strong invariance above. This model showed good fit, but was still shy off fulfilling the Δ CFI < .01 criterion (Δ CFI = .011). The modification indices indicated that equating the

intercepts of items four across time points decreased model fit most. Therefore, I also allowed the intercept of item four to vary freely between time points while keeping the rest of the model identical to the previous one. This model fit the data well and fulfilled the Δ CFI < .01 criterion, indicating partial strong measurement invariance across time points. Hence, except for items three and four, the intercepts of the TEIMS items could be equated across time points.

The means of items three and four changed over time points in opposing directions. The mean of item three (M_{t1} = 4.62) dropped slightly at $t2$ (M_{t2} = 4.57) and then increased markedly at $t3$ (M_{t3}= 4.78), while the mean of item four (M_{t1} = 4.48) first increased slightly (M_{t2} = 4.55) and then dropped markedly (M_{t3}= 4.26). These two items have in common that they both include a time reference (item three "[…] I *quickly* [italics added] find an aspect of the activity that appeals to me."; item four "[…] this does not change, no matter *how long* [italics added] I engage in it."). My interpretation is that these items with a time reference might be more sensitive to recent examples of experiencing intrinsic motivation that come to participants' minds while answering the items. Therefore, these items might not as easily be equated across time points. As the means of the two items changed in opposing directions to each other, these two items might covary negatively over time. The results of the measurement invariance testing over time should be interpreted with caution, because sample sizes were relatively low for this kind of analysis (*N*s ranging from 142 to 212 per time point). Future research should address this question with larger samples to see if the observed patterns replicate.

Nomological net. Table 3 shows the zero-order correlations between the TEIMS and constructs in the nomological net. As expected, correlations were small to moderate with one exception (self-motivation ability).

First, in the category "positive affectivity and life satisfaction," as expected, constructs related to more positive states (explicit and implicit positive affectivity and BAS) and high life satisfaction showed positive relationships with the TEIMS. Importantly, the positive association with *implicit* positive affectivity indicated that the associations between the TEIMS and measures of positive affectivity were not merely due to shared method variance. Also as expected, the TEIMS was negatively

related with explicit trait negative affectivity and BIS, whereas the negative correlation with implicit negative affectivity, against my expectation, did not reach significance. Overall, these results are consistent with the argument from the introduction that persons who experience positive affect more often also experience higher intrinsic motivation during activities and vice versa (Martin et al., 1993; Oerlemans & Bakker, 2014).

Second, in the category "emotion regulation," as expected, constructs related to effective emotion regulation (reappraisal, action orientations, and trait mindfulness) showed positive relationships with the TEIMS. This is consistent with another argument from the introduction, namely that effective emotion regulators should generally experience activities as more intrinsically motivating, because they should be able to down-regulate negative emotions and up-regulate positive emotions during activities. Against my expectations, the negative correlation with suppression did not reach significance.

Third, in the category "personality and self-regulation," as expected, extraversion, openness, flow frequency, and all self-regulatory traits showed positive relationships with the TEIMS. This is consistent with several of my arguments: (1) extraversion might, due to its overlap with trait positive affectivity, lead to and result from enjoying activities (Martin et al., 1993; Oerlemans & Bakker, 2014); (2) openness might lead to more experiences of intrinsic motivation through interest, joy, and awe (Mitte & Kämpfe, 2008; Shiota et al., 2006); (3) the autotelic personality, as measured by self-reported flow frequency, does not seem to be strongly related to the self-reported frequency of experiencing intrinsically motivated states outside of flow, which supports the proposed distinction of the two constructs; (4) playful individuals may make activities more intrinsically motivating by reframing them in a self-entertaining way; (5) self-regulatory traits might enhance the intrinsic experiences of activities through allowing progress and building competence (Amabile & Kramer, 2011; Bandura & Schunk, 1981; Schüler et al., 2010) or through allowing people to regulate the experience of their activities (Converse et al., 2018; Sansone et al., 1992). Note that self-motivation ability showed the only large correlation with the TEIMS in the nomological net. At $r = .58$, this association was still considerably below the conventional threshold of $r = .85$, at which two

scales are considered to have too low discriminant validity (Brown, 2015). To test if the two scales would differentially predict outcomes and therefore further suggest different latent constructs, I included self-motivation in the tests of incremental validity of the TEIMS. Neuroticism was negatively related with the TEIMS, as expected based on its overlap with negative affectivity and the BIS. Agreeableness, for which I had no expectations, was positively correlated with the TEIMS.

Fourth and lastly, in the category "needs and attitudes," results were mixed regarding my expectations. I expected positive relationships for all measures except global extrinsic motivation/goal-incentive focus and global amotivation, for which I expected negative relationships. Concerning motivational orientations, most relationships were as expected: Scales of global intrinsic motivation and activity-incentive focus showed positive correlations with the TEIMS, and two out of three global extrinsic motivation subscales (i.e., external regulation and introjected) and the global amotivation subscale showed negative correlations. Instead of showing negative correlations and, hence, against expectations, global integrated extrinsic motivation showed a positive correlation and goal-incentive focus showed a near zero-correlation with the TEIMS. Yet, overall, these patterns are mostly consistent with the argument that valuing activity-intrinsic characteristics would make people more likely to engage in intrinsically motivated activities and therefore experience intrinsic motivation more often, while the opposite would hold for valuing extrinsic characteristics (or being generally amotivated). Except for the moderate correlation between the TEIMS and the global intrinsic motivation to know, correlations were small, which was somewhat surprising, because measures of motivational orientations are also conceptualized as individual differences in intrinsic motivation. This finding, however, supports the differentiation between the two aspects of intrinsic motivation (motivational core vs. experience), which also suggests that individual differences in *experiencing* intrinsic motivation, as measured by the TEIMS, are different from previous concepts of trait-level intrinsic motivation, which emphasize valuing intrinsic motivation as *reasons* for engaging in activities.

I had no expectations about relationships between implicit motives and the TEIMS, because I argued that they should depend on the unknown ratios of incentives to disincentives in persons' activities. In both samples, all relationships

with implicit motives were close to zero, except for a small negative relationship with the power motive in Sample D. Hence, the pleasure derived from incentives for people with high implicit motives seems to be nullified by the displeasure from disincentives (Schultheiss et al., 2008). Regarding explicit motives the only significant relationship was with the explicit achievement motive. So, mostly contrary to expectations, feeling a sense of goal-directedness does not seem to increase the experience of intrinsic motivation regardless of goal content. Also mostly contrary to expectations, the only significant relationship between the TEIMS and indicators of basic need satisfaction was with competence. This may suggest that the experience of intrinsic motivation has two largely independent influences: Individual differences, as measured by the TEIMS, and situational factors that lead to the satisfaction of basic needs, as described by basic need theory (Deci & Ryan, 2000). Finally, the relationship between dispositional attitudes and the TEIMS was in the expected direction, but not significant. Accordingly, persons who generally like stimuli do not seem to experience substantially more intrinsic motivation in general.

INTERIM CONCLUSIONS

Concerning the first research question, the Pilot Study and Study 1 showed that individuals differed in their self-reported experience of intrinsic motivation during activities in general. The initial and the final versions of the TEIMS captured these differences both validly and reliably. Indicating stable differences, the test-retest reliabilities over 1 and 4 months were high. The TEIMS showed good psychometric properties and was not redundant with any of the measures in a wide nomological net. Regarding the second research question, the initial TEIMS version predicted reduced boredom in the laboratory. In the following Studies 2 through 6, I addressed the second research question further by testing the predictive (and incremental) validity of the final TEIMS version.

STUDY 2

PREDICTING STUDY PARTICIPATION AND VIGNETTE ACTIVITY ENJOYMENTS

In the Pilot Study I predicted reduced boredom in the laboratory with the initial TEIMS version. The aim of Study 2 was to test the predictive validity of the final version. I hypothesized that individuals with higher TEIMS scores would report higher momentary intrinsic motivation, operationalized as enjoyment of actual study participation and various other activities that were presented in vignettes. I explored, how well-established constructs, namely positive affectivity, implicit motives, emotion regulation, and self-motivation, could predict enjoyment and if the TEIMS could incrementally predict it over the above. I chose these constructs either because they should be theoretically relevant for experiencing intrinsic motivation, but they had not been investigated from this perspective, or, in the case of self-motivation, because of its large correlation with the TEIMS in the nomological net.

METHODS

Participants and procedure. This study was part of a larger project on activity enjoyment. Original power considerations focused on one of the main aims of that project, namely being able to detect a zero-order correlation of at least $\rho = .20$ between implicit motives (see nomological net Study 1) and the TEIMS with 80% power. Using G*Power 3 (Faul, Erdfelder, Lang, & Buchner, 2007), I calculated that I would need at least $N = 153$. Sampling stopped at $N = 164$, because there were still

eleven persons interested in study participation after study advertisement had ended. Two participants were excluded, because their self-reported German skills were below the mid-point of the 7-point scale. This study is based on Sample D (see Table 1). It was a correlational online study and consisted of three parts. At the end of each part, participants rated their enjoyment of the respective study part. The first part ("PSE part") included an informed consent page, a Picture Story Exercise (PSE, McClelland et al., 1989), in which participants wrote imaginative stories that were later coded for implicit motive content, demographic items, and a Big Five measure. The second part ("vignette part") included measures of life satisfaction and mood, followed by enjoyment ratings of 30 activity vignettes. The third part ("questionnaire part") included the TEIMS, followed by various personality questionnaires and the debriefing. Study parts lasted around 20 to 30 minutes each. To avoid fatigue, the link to the respectively next part was sent to participants two hours after completion of a previous part.

Measures and materials. If not otherwise noted, participants answered items on 7-point Likert type scales with larger values indicating greater agreement.

Trait experience of intrinsic motivation. The TEIMS is described in Study 1 ($\alpha = .79$).

Mood before rating vignette activities. Participants indicated their current mood on the according sub-scale of the state version of the German Multidimensional Mood State Questionnaire (MDMQ; Steyer et al., 1997; $\alpha = .91$). It is identical to the trait version described in Study 1, except that items are rated with regard to the current state.

Study participation enjoyment. Participants rated how much they enjoyed working on the current study part on eight items that our research team had created based on the Intrinsic Motivation Inventory (Ryan, 1982), but designed to reflect the study participation experience more specifically. The eight items were "The study earlier was fun," "The study earlier was very tedious," "The study earlier was interesting," "The study earlier was unpleasant," "I enjoyed the study earlier a lot," "The study earlier was boring," and "The study earlier was very exhausting." Negative

items were recoded before calculating the scale average. Internal consistencies were good to excellent for the three study parts, ranging from $\alpha = .87$ to $\alpha = .90$.

Activity vignettes. I generated a pool of 36 diverse activity vignettes to reflect activities from various domains in life (e.g., work, study, leisure, transportation, sports, time alone, time with others, shopping, housework, etc.). Examples of vignettes were "go for a run in the woods for one hour," "buy Christmas presents for 4 persons," and "set up a newly bought laptop (install programs, ensure anti-virus protection, set up internet, etc.)." In a small pilot study, seven adults rated the vignettes for how much they would like to engage in them. I selected the 30 vignettes with the highest variances on this item. I also did not include vignettes with very high average enjoyment ratings (range *M*s = 1.43 to 4.71)

Vignette activity enjoyment. In the final study, I measured vignette activity enjoyment with two items: "How much would you like to engage in this activity?" and "How much would you enjoy this activity?" Internal consistencies of the two items for the 30 vignettes were excellent with αs ranging from .90 to .98.

Measures for test of incremental validity. All measures used here are described and cited in Table 3. Trait positive affectivity was measured with the PANAVA-KS ($\alpha = .73$), implicit motives with a six-picture PSE, reappraisal with the ERQ ($\alpha = .82$), prospective and failure-related action orientations with the HAKEMP 90 ($\alpha = .79$ and $\alpha = .76$, respectively), and self-motivation ability with the VCI ($\alpha = .86$).

RESULTS AND DISCUSSION

Study participation enjoyment. Ratings of participation enjoyment (Level 1) were nested within participants (Level 2). Therefore, I used multilevel modelling to test the hypothesis that the tendency to generally experience intrinsic motivation, as measured by the TEIMS, would predict momentary intrinsic motivation, as measured by study participation enjoyment. All multilevel analyses reported in this thesis were conducted with the lme4 package for R (Bates, Mächler, Bolker, & Walker, 2015), using restricted maximum likelihood estimation, Satterthwaite

degrees of freedom approximation, and parametric bootstrapped confidence intervals. I predicted participation enjoyment by the grand-mean centered TEIMS score (Level 2) moderated by study part (Level 1) in a random intercept random slope model. Table 5 shows the results. The TEIMS did not positively predict participation enjoyment in the PSE study part (p = .777), but in the vignette (p = .035) and questionnaire (p = .009) study parts. In these study parts, one could expect a 0.24 and 0.29 point increase in participation enjoyment, respectively, for every point increase in the TEIMS score.

In sum, data were largely consistent with the hypothesis that individuals with higher (compared to lower) trait experience of intrinsic motivation would enjoy participating in the various study parts more.[3] The non-significant result in the PSE part might be due to random variation, because the TEIMS predicted enjoyment of the PSE in two other samples. Specifically, in Samples E and F (pooled N = 283), I measured enjoyment of the PSE with five items among eight distractor items. These items were "Writing the stories was fun to me," "It was effortful to write the stories" (reverse coded), "Writing the stories stressed me out" (reverse coded), "I would participate in another study that would be about writing stories like these," and "I was satisfied with myself when I was writing the stories." Internal consistency was good, Cronbach's α = .85, so items were averaged. The TEIMS positively predicted enjoyment of the PSE in the combined sample in a simple linear regression, $F(1, 281) = 15.31$, $p < .001$, $R^2 = .05$, $b = 0.32$, $\beta = .23$, 95% CI [.11, .34].

Predictive power of established constructs and incremental validity of the TEIMS regarding study participation enjoyment. To explore how well established constructs predicted study participation enjoyment, I included positive affectivity, implicit motives, reappraisal, prospective and failure-related action orientations, and self-motivation as grand-mean centered Level 2 fixed effects predictors in a random intercept multilevel model predicting participation

[3] I obtained similar results when omitting study part as a moderator and testing the TEIMS's prediction of participation enjoyment over all three parts (intercept: Estimate = 4.75, SE = 0.07, $t(159) = 72.32$, $p < .001$, 95% CI [4.63, 4.87]; TEIMS: Estimate = 0.20, SE = 0.07, $t(66) = 2.72$, $p = .008$, 95% CI [0.05, 0.35]).

enjoyment (Level 1). Table 6 displays the results. None of the scales were significant predictors of enjoyment (*p*s ranged from .076 to .880).

To test, if the TEIMS would predict participation enjoyment incrementally over the above, I included it as a grand-mean centered Level 2 fixed effects predictor in the above model. I also ran separate models, only including one covariate at a time. Results are displayed in Table 6 and an overview of the incremental validity of the TEIMS is displayed in Table 7. Like the established constructs, the TEIMS was not a significant predictor in the model including all covariates. Yet, it predicted participation enjoyment in all models with single covariates, except in the model including self-motivation.

Table 5
Results from Multilevel Regression Model of the TEIMS Moderated by Study Part on Participation Enjoyment (Study 2)

Predictor	Est.	*SE*	*t*	*df*	*p*	95% CI
Intercept	4.93	0.09	55.75	392	< .001***	[4.74, 5.10]
TEIMS	.03	0.10	0.28	180	.777	[–0.17, 0.24]
Vignette part	–.20	0.10	–1.99	320	.048*	[–0.39, 0.02]
Questionnaire part	–.32	0.10	–3.11	320	.002**	[–0.52, –0.10]
TEIMS × Vignette part	.24	0.11	2.11	320	.035*	[0.01, 0.45]
TEIMS × Questionnaire part	.29	0.11	2.61	320	.009**	[0.06, 0.50]

Note. Satterthwaite approximation to degrees of freedom. TEIMS scores were grand-mean centered. Study part 1 (PSE) was the reference study part.
* $p < .05$ ** $p < .01$ *** $p < .001$

Vignette activity enjoyment. Ratings of vignette activity enjoyments (Level 1) were also nested within participants (Level 2), so I again used multilevel modelling to test my hypothesis. I predicted vignette activity enjoyment by the grand-mean centered TEIMS score (Level 2) in a random intercept random slope model. Consistent with the hypothesis, the TEIMS positively predicted enjoyment of the thirty vignette activities (intercept: Estimate = 3.86, *SE* = 0.04, $t(154) = 93.17$, $p < .001$, 95% CI [3.78, 3.94]; TEIMS: Estimate = 0.32, *SE* = 0.05, $t(85) = 6.19$, $p < .001$, 95% CI [0.21, 0.42]). Controlling for mood did not change results significantly. These results indicate that the TEIMS has good content validity, because persons, who rated their tendency to experience intrinsic motivation higher, also rated their enjoyment of thirty diverse activities as higher, regardless of the mood they were in.

Table 6

Results from Multilevel Regression Models Predicting Study Participation Enjoyment (Study 2)

Predictors	Est.	*SE*	*t*	*df*	*p*	95% CI
Model 1: Covariates only						
Intercept	4.78	0.07	72.88	151	< .001***	[4.67, 4.91]
Positive affectivity	0.03	0.08	0.33	151	.743	[–0.14, 0.19]
Implicit achievement motive	–0.01	0.07	–0.15	151	.880	[–0.14, 0.13]
Implicit affiliation motive	0.08	0.07	1.14	151	.258	[–0.06, 0.21]
Implicit power motive	–0.07	0.07	–1.09	151	.279	[–0.21, 0.05]
Reappraisal	0.01	0.08	1.77	151	.079	[–0.01, 0.30]
Prospective action orientation	0.04	0.02	1.79	151	.076	[–0.01, 0.01]
Failure-related action orientation	–0.01	0.03	–0.41	151	.686	[–0.06, 0.04]
Self-motivation	0.03	0.08	0.43	151	.667	[–0.12, 0.19]
Model 2: All covariates and TEIMS						
Intercept	4.78	0.07	73.05	150	< .001***	[4.64, 4.90]
Positive affectivity	0.02	0.08	0.23	149	.819	[–0.17, 0.20]
Implicit achievement motive	–0.01	0.07	–0.22	146	.830	[–0.15, 0.12]
Implicit affiliation motive	0.08	0.07	1.26	148	.211	[–0.06, 0.21]
Implicit power motive	–0.06	0.07	–0.95	147	.343	[–0.20, 0.07]
Reappraisal	0.13	0.08	1.61	148	.111	[–0.02, 0.28]
Prospective action orientation	0.04	0.02	1.83	132	.067	[–0.01, 0.09]
Failure-related action orientation	–0.01	0.03	–0.56	146	.577	[–0.06, 0.04]
Self-motivation	–0.01	0.09	–0.11	148	.917	[–0.18, 0.17]
TEIMS	0.11	0.09	1.12	95	.235	[–0.07, 0.28]
Model 3: Positive affectivity and TEIMS						
Intercept	4.77	0.07	72.39	159	< .001***	[4.62, 4.89]
Positive affectivity	0.07	0.07	1.01	159	.312	[–0.08, 0.21]
TEIMS	0.19	0.08	2.40	159	.018*	[0.04, 0.33]
Model 4 : Implicit motives and TEIMS						
Intercept	4.78	0.07	72.45	155	< .001***	[4.64, 4.91]
Implicit achievement motive	0.00	0.07	0.05	155	.961	[–0.13, 0.14]
Implicit affiliation motive	0.09	0.07	1.30	155	.196	[–0.05, 0.21]
Implicit power motive	–0.06	0.07	–0.86	155	.393	[–0.19, 0.06]
TEIMS	0.19	0.07	2.62	155	.010**	[0.03, 0.33]
Model 5: Reappraisal and TEIMS						
Intercept	4.77	0.07	72.88	159	< .001***	[4.62, 4.91]
Reappraisal	0.14	0.08	1.79	159	.076	[–0.02, 0.28]
TEIMS	0.17	0.08	2.23	159	.027*	[0.02, 0.34]
Model 6: Prospective AO and TEIMS						
Intercept	4.77	0.07	73.18	159	< .001***	[4.64, 4.89]
Prospective action orientation	0.05	0.02	2.13	159	.035*	[0.00, 0.09]
TEIMS	0.18	0.07	2.40	159	.018*	[0.00, 0.33]
Model 7: Failure-related and TEIMS						
Intercept	4.77	0.07	72.39	159	< .001***	[4.63, 4.89]
Failure-related action orientation	0.02	0.02	1.01	159	.396	[–0.03, 0.07]
TEIMS	0.20	0.08	2.40	159	.011*	[0.05, 0.35]
Model 8: Self-motivation and TEIMS						
Intercept	4.77	0.07	72.67	159	< .001***	[4.63, 4.90]
Self-motivation	0.11	0.07	1.53	159	.128	[–0.03, 0.24]
TEIMS	0.14	0.09	1.65	159	.101	[–0.02, 0.32]

Note. AO = action orientation. Satterthwaite approximation to degrees of freedom. All Level 2 predictors were grand-mean centered, except implicit motive scores, which were *z*-scores.

* $p < .05$ ** $p < .01$ *** $p < .001$

Table 7
Overview of the Incremental Validity of the TEIMS (Studies 2 through 6)

		Unstandardized effect sizes for the TEIMS predicting outcomes, when single or all covariates are included[a]						
Outcome	Study	Positive affectivity	Implicit motives	Reapp-raisal	Prospec-tive AO	Failure-related AO	Self-motiva-tion	All
Activity Enjoyment								
Study participation	2	0.19*	0.19**	0.17*	0.18*	0.20*	0.14	0.11
		(0.08)	(0.07)	(0.08)	(0.07)	(0.08)	(0.09)	(0.09)
Vignette activities	2	0.31***	0.31***	0.30***	0.30***	0.31***	0.30***	0.28***
		(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.06)	(0.06)
Gym Exercise	3	0.15**	0.28***	0.15*	0.15**	0.13*	0.07	0.12
		(0.06)	(0.07)	(0.06)	(0.05)	(0.06)	(0.06)	(0.09)
Boredom								
during picture-word matching task	4 (wave 1)	–0.72*** (0.21)	—	—	–0.77*** (0.19)	–0.75*** (0.19)	–0.89*** (0.22)	–0.79** (0.24)
during picture-word matching task	4 (final sample)	–0.43*** (0.12)	—	—	–0.47*** (0.11)	–0.47*** (0.11)	–0.54*** (0.13)	–0.51*** (0.14)
during listening to audio	6	–0.14 (0.17)	—	–0.26† (0.16)	–0.29† (0.16)	–0.27† (0.15)	–0.38* (0.19)	–0.20 (0.21)
Voluntary Persistence								
during picture-word matching task	4 (wave 1)	2.01*	—	—	2.07*	1.93*	2.51*	2.42*
while listening to audio	5	2.15*	—	—	2.11*	2.11†	2.13†	2.04†
while listening to audio	6	1.85*	—	1.53†	2.01**	1.66*	2.08*	2.23*

Note. [a] Est./*b*s and *SE* in case of activity enjoyment and boredom, odds ratios in case of persistence. AO = Action orientation. Implicit motive data were not available for Studies 4 through 6. Reappraisal was not measured in Studies 4 and 5.
† $p < .10$ * $p < .05$ ** $p < .01$ *** $p < .001$

Predictive power of established constructs and incremental validity of the TEIMS regarding vignette activity enjoyment. The following analyses were analogous to the above tests for predictive power of established constructs and incremental validity of the TEIMS, but with vignette activity enjoyment as the dependent variable. Table 8 shows the results. Again, none of the scales were significant predictors of enjoyment (*p*s ranged from .065 to .803). The TEIMS, however, predicted vignette activity enjoyment, and did so over all covariates, both, when they were entered simultaneously and separately (see Tables 7 and 8).

While an advantage of using vignettes is the ability to tap into the enjoyment of many diverse activities in an economical way, a limitation is that there may be unknown differences between the participants' experiences of a situation in real life versus making an assessment of those experiences in reaction to a vignette (Hughes & Muby, 2004). Thus, I aimed to test the TEIMS's predictive validity more in depth

singling out one real life activity, namely exercise, and measure its enjoyment in the field over the course of 1 month in Study 3.

Table 8

Results from Multilevel Regression Model Predicting Vignette Activity Enjoyment (Study 2)

Predictors	Est.	*SE*	*t*	*df*	*p*	95% CI
Model 1: Covariates only						
Intercept	3.88	0.05	85.31	151	< .001***	[3.78, 3.96]
Positive affectivity	0.04	0.06	0.71	151	.479	[–0.07, 0.15]
Implicit achievement motive	0.06	0.05	1.30	151	.195	[–0.02, 0.16]
Implicit affiliation motive	0.01	0.05	0.25	151	.803	[–0.09, 0.10]
Implicit power motive	–0.08	0.05	–1.73	151	.086	[–0.17, 0.01]
Reappraisal	0.11	0.06	1.86	151	.065	[0.00, 0.22]
Prospective action orientation	0.02	0.02	1.23	151	.219	[–0.02, 0.05]
Failure-related action orientation	0.01	0.02	0.54	151	.588	[–0.02, 0.05]
Self-motivation	0.06	0.06	1.12	151	.267	[–0.05, 0.17]
Model 2: All covariates and TEIMS						
Intercept	3.87	0.04	91.38	150	< .001***	[3.79, 3.95]
Positive affectivity	0.01	0.05	0.23	150	.818	[–0.09, 0.13]
Implicit achievement motive	0.05	0.04	1.26	150	.211	[–0.04, 0.14]
Implicit affiliation motive	0.03	0.04	0.71	150	.477	[–0.05, 0.12]
Implicit power motive	–0.05	0.04	–1.28	150	.218	[–0.14, 0.04]
Reappraisal	0.08	0.05	1.47	150	.143	[–0.03, 0.18]
Prospective action orientation	0.02	0.02	1.57	150	.119	[–0.01, 0.06]
Failure-related action orientation	0.00	0.02	0.21	150	.836	[–0.03, 0.04]
Self-motivation	–0.04	0.06	–0.67	150	.507	[–0.14, 0.08]
TEIMS	0.28	0.06	4.83	150	< .001***	[0.17, 0.40]
Model 3: Positive affectivity and TEIMS						
Intercept	3.87	0.04	91.21	159	< .001***	[3.78, 3.96]
Positive affectivity	0.04	0.05	0.89	159	.376	[–0.05, 0.15]
TEIMS	0.31	0.05	6.24	159	< .001***	[0.21, 0.42]
Model 4 : Implicit motives and TEIMS						
Intercept	3.87	0.04	91.11	155	< .001***	[3.79, 3.96]
Implicit achievement motive	0.06	0.04	1.48	155	.141	[–0.02, 0.15]
Implicit affiliation motive	0.03	0.04	0.69	155	.494	[–0.06, 0.12]
Implicit power motive	–0.05	0.04	–1.25	155	.212	[–0.14, 0.03]
TEIMS	0.30	0.05	6.57	155	< .001***	[0.22, 0.40]
Model 5: Reappraisal and TEIMS						
Intercept	3.87	0.04	91.78	159	< .001***	[3.80, 3.96]
Reappraisal	0.08	0.05	1.67	159	.097	[–0.01, 0.18]
TEIMS	0.30	0.05	6.14	159	< .001***	[0.21, 0.40]
Model 6: Prospective AO and TEIMS						
Intercept	3.87	0.04	92.10	159	< .001***	[3.78, 3.96]
Prospective action orientation	0.03	0.01	1.98	159	.049*	[0.00, 0.05]
TEIMS	0.30	0.05	6.44	159	< .001***	[0.20, 0.40]

Table 8 (*continued*)

Predictors	Est.	*SE*	*t*	*df*	*p*	95% CI
Model 7: Failure-related AO and TEIMS						
Intercept	3.87	0.04	91.47	159	< .001***	[3.79, 3.96]
Failure-related action orientation	0.02	0.02	1.29	159	.198	[–0.01, 0.05]
TEIMS	0.31	0.05	6.34	159	< .001***	[0.21, 0.41]
Model 8: Self-motivation and TEIMS						
Intercept	3.87	0.04	91.17	159	< .001***	[3.80, 3.96]
Self-motivation	0.04	0.05	0.79	159	.431	[–0.05, 0.12]
TEIMS	0.30	0.06	5.44	159	< .001***	[0.20, 0.42]

Note. AO = action orientation. Satterthwaite approximation to degrees of freedom. All Level 2 predictors were grand-mean centered, except implicit motive scores, which were *z*-scores.

STUDY 3

PREDICTING EXERCISE ENJOYMENT IN THE FIELD

In Study 3, I aimed to replicate the findings from Study 2 with the more rigorous method of ambulatory assessment. Specifically, I measured repeatedly over 1 month how much participants enjoyed a goal-directed activity, namely gym exercise, as they executed it in their day-to-day lives outside of the lab. I hypothesized that the TEIMS would predict exercise enjoyment in the field. I again tested, how well positive affectivity, implicit motives, reappraisal, prospective and failure-related action orientations, and self-motivation predicted intrinsic motivation and if the TEIMS could predict it over the above.

METHODS

Participants and procedure. Study 3 was conducted in a larger project on self-regulation strategies and enjoyment during goal-pursuit. Based on power considerations for the main research question of that project our research team aimed at $N = 210$, recruitment stopped at $N = 214$. Twenty participants were excluded for the following reasons (hence N for analysis = 194): Technical issues (one person), non-compliance with instructions (two persons), and missing values on all items of the dependent variable (17 persons). This study is based on Sample B (see Table 1). Participants were eligible for the study if they intended to start a regular exercise program, were willing to start a gym membership (if not already existent), spoke German well (assessed in telephone pre-screening), had a smartphone with

mobile internet, and did not have any medical conditions that would contraindicate regular gym exercise. The study was also designed to test a hypothesis unrelated to the present research. This is, why there were three conditions: The experimental condition, the control-intervention condition, and the no-intervention condition.

In the experimental condition, participants formed implementation intentions to remind themselves of their exercise goal in order to stay persistent whenever their current exercise was unpleasant to them. In the control-intervention condition, participants formed implementation intentions to count to ten in such situations. In the no-intervention condition, there was no intervention. Participants filled out four baseline online questionnaires including the TEIMS and other personality and demographic measures, before stating their main goal for exercising and making an exercise plan at the beginning of each of four consecutive weeks. Before every exercise session, participants in the experimental and control-intervention conditions received a reminder of their respective interventions. Before and after every exercise session in the gym, they filled out a few questions on their smartphones, including mood before and after exercise as well as exercise duration and enjoyment of exercise after the session. After the four exercise weeks and three months after the last exercise week, they filled out follow-up questionnaires including the TEIMS and goal-related measures. The study involved a total participant burden of about three hours.

Due to a programming mistake, participants in the control-intervention condition received contradictory instructions regarding their intervention at different times during the study: Where the intervention of forming implementation intentions was first introduced, they erroneously received the instructions of the experimental group. Yet, before every exercise session, they were reminded to count to ten, if exercise should become difficult to persist in. This makes data from the control-intervention condition that was collected after the baseline (i.e., starting with the first exercise session, where they received contradictory instructions for the first time) difficult to interpret. It is unknown how this error influenced their experiences and response behaviors. I will consider this point in the discussion of the results.

Measures.

Trait experience of intrinsic motivation. The TEIMS is described in Study 1 (α = .78).

Mood before exercise. Participants indicated their mood before every exercise session on two items that were based on the state version of the German Multidimensional Mood State Questionnaire (MDMQ; Steyer et al., 1997). To reduce subject burden, the four items of the MDMQ mood sub-scale ("satisfied," "good," "bad," "uneasy") were combined to two items, with each two instead of one mood adjective (e.g., "satisfied, good"). Internal consistencies were calculated for all sessions with at least *N* = 100 participants (see Yurdugül, 2008) and were mostly acceptable with alphas ranging from .64 to .77.

Exercise enjoyment. Participants rated their enjoyment of the exercise right after the gym session with the eight study participation enjoyment items described in Study 2, which were adapted for the exercise context. An example item is "I enjoyed the exercise a lot today." Internal consistencies were calculated for all sessions with at least *N* = 100 participants (see Yurdugül, 2008) and were acceptable to good with alphas ranging from .78 to .87.

Measures for test of incremental validity. All measures used here are described in Table 3. Trait positive affectivity was measured with the MDMQ (α = .86), implicit motives with a five-picture PSE, reappraisal with the ERQ (α = .82), prospective and failure-related action orientations with the HAKEMP 90 (α = .80 each), and self-motivation with the VCI (α = .80).

RESULTS AND DISCUSSION

Predictive validity of the TEIMS regarding exercise enjoyment. I used multilevel modelling to test if the TEIMS (Level 2) positively predicted exercise enjoyment (Level 1) in a random intercept random slope model (the TEIMS was again grand-mean centered). I controlled for condition, dummy-coded into two variables (dummy-variable 1: experimental condition = 1, other two conditions = 0; dummy-variable 2: no-intervention condition = 1, other two conditions = 0) by

including them as main effect predictors in the model. Consistent with the hypothesis, the TEIMS predicted increased enjoyment during exercise (intercept: Estimate = 4.81, *SE* = 0.08, $t(188) = 58.59$, $p < .001$, 95% CI [4.62, 4.97]; TEIMS: Estimate = 0.19, *SE* = 0.05, $t(173) = 3.72$, $p < .001$, 95% CI [0.09, 0.29]. One could expect a 0.19 point increase in exercise enjoyment for every point increase in the TEIMS. Condition had no effect on exercise enjoyment (dummy-variable 1: Estimate = −0.03, *SE* = 0.12, $t(181) = -0.27$, $p = .789$, 95% CI [−0.27, 0.19]; dummy-variable 2: Estimate = −0.21, *SE* = 0.12, $t(175) = -1.81$, $p = .071$, 95% CI [−0.42, 0.02]). Controlling for mood did not change results significantly.

I did not expect condition to moderate these results, but tested this in a multilevel model, comparable to the one above, but also including the interaction terms for the TEIMS and the two dummy-variables. I found that the TEIMS did not predict exercise enjoyment in the control-intervention condition (intercept: Estimate = 4.77, *SE* = 0.08, $t(184) = 58.23$, $p < .001$, 95% CI [4.62, 4.92]; TEIMS: Estimate = 0.01, *SE* = 0.08, $t(174) = 0.07$, $p = .944$, 95% CI [−0.16, 0.18]), but in the experimental (TEIMS × dummy-variable 1: Estimate = 0.30, *SE* = 0.12, $t(170) = 2.46$, $p = .015$, 95% CI [0.05, 0.54]) and no-intervention conditions (TEIMS × dummy-variable 2: Estimate = 0.26, *SE* = 0.12, $t(173) = 2.16$, $p = .032$, 95% CI [0.02, 0.49]). Again, the dummy-variables had no effects on exercise enjoyment (dummy-variable 1: Estimate = 0.02, *SE* = 0.12, $t(190) = 0.17$, $p = .866$, 95% CI [−0.20, 0.25]; dummy-variable 2: Estimate = −0.16, *SE* = 0.12, $t(170) = -1.35$, $p = .178$, 95% CI [−0.38, 0.04]).

The result that the TEIMS did not predict exercise enjoyment in the control-intervention condition might be due to random variation or, more likely, due to the contradicting instructions regarding the intervention. The intervention was a central part of the study and participants were recruited (among other things) with the prospect of possibly tackling their personal exercise goal with the help of a psychological intervention. Being reminded of an intervention before every exercise session that was inconsistent with the original intervention at baseline might have frustrated or irritated participants and lowered their compliance. Their responses to items regarding exercise enjoyment might have been noisier, potentially biased by their reactions to the inconsistent instructions (e.g., with frustration), and probably

even intentionally misleading to harm the "inattentive scientists." This multilevel model with condition as a moderator revealed that the simpler main effect model reported first underestimated the relationships between the TEIMS and exercise enjoyment in the experimental and no-intervention conditions. The moderated model showed estimators of 0.30 and 0.26, respectively, for these groups, compared to 0.19 over all three conditions in the simpler model.

Predictive power of established constructs and incremental validity of the TEIMS regarding exercise enjoyment. As in Study 2, I included positive affectivity, implicit motives, cognitive reappraisal, prospective and failure-related action orientations, and self-motivation ability as grand-mean centered Level 2 fixed effects predictors in a random intercept multilevel model predicting exercise enjoyment (Level 1). Table 9 displays the results. Self-motivation was the only significant predictor of enjoyment (Estimate = 0.28, *SE* = 0.08, $t(178) = 3.35$, $p = .001$, 95% CI [0.10, 0.44]). *P*-values for the other measures ranged from .152 to .723. So, again, the established constructs (except for self-motivation) were poor predictors of enjoyment.

To test, if the TEIMS would predict exercise enjoyment incrementally over the above, I included it as a grand-mean centered Level 2 fixed effects predictor in the above model. I also ran separate models, only including one covariate at a time. Tables 7 and 9 display results. Like with participation enjoyment in Study 2, the TEIMS predicted exercise enjoyment in all models with single covariates, except in the model including self-motivation and in the model including all covariates.

INTERIM CONCLUSIONS REGARDING THE TEIMS'S INCREMENTAL VALIDITY AND THE ESTABLISHED TRAITS' PREDICTIVE VALIDITIES

The tests in Studies 2 and 3 indicate that the TEIMS has incremental validity when predicting activity enjoyment over several established traits that are characterized by frequently experiencing positive affect, deriving pleasure from incentives (i.e., implicit motives), and successfully regulating emotions. Regarding incremental

Table 9

Results from Multilevel Regression Model Predicting Exercise Enjoyment (Study 3)

Predictors	Est.	*SE*	*t*	*df*	*p*	95% CI
Model 1: Covariates only						
Intercept	4.67	0.06	79.30	111	< .001***	[4.56, 4.80]
Positive affectivity	0.01	0.06	0.15	118	.880	[–0.11, 0.14]
Implicit achievement motive	0.02	0.06	0.40	119	.691	[–0.09, 0.13]
Implicit affiliation motive	0.03	0.06	0.54	118	.587	[–0.09, 0.15]
Implicit power motive	0.04	0.06	0.58	110	.564	[–0.09, 0.16]
Reappraisal	0.05	0.07	0.72	121	.471	[–0.07, 0.17]
Prospective action orientation	0.01	0.02	0.35	116	.729	[–0.04, 0.05]
Failure-related action orientation	0.02	0.02	0.72	114	.473	[–0.02, 0.06]
Self-motivation	0.28	0.08	3.35	118	.001**	[0.10, 0.44]
Model 2: All covariates and TEIMS						
Intercept	4.69	0.06	79.52	110	< .001***	[4.56, 4.81]
Positive affectivity	0.00	0.06	–0.04	117	.968	[–0.14, 0.11]
Implicit achievement motive	0.02	0.06	0.36	119	.717	[–0.09, 0.13]
Implicit affiliation motive	0.04	0.06	0.63	117	.533	[–0.07, 0.16]
Implicit power motive	0.05	0.06	0.79	111	.429	[–0.08, 0.16]
Reappraisal	0.03	0.08	0.00	121	.997	[–0.14, 0.15]
Prospective action orientation	0.01	0.02	0.52	116	.604	[–0.03, 0.06]
Failure-related action orientation	0.01	0.02	0.48	113	.631	[–0.03, 0.06]
Self-motivation	0.25	0.09	2.94	119	.004**	[0.07, 0.41]
TEIMS	0.12	0.09	1.40	114	.165	[–0.05, 0.29]
Model 3: Positive affectivity and TEIMS						
Intercept	4.73	0.05	99.87	188	< .001***	[4.65, 4.82]
Positive affectivity	0.13	0.05	2.79	188	.006**	[0.05, 0.22]
TEIMS	0.15	0.06	2.69	187	.008**	[0.04, 0.25]
Model 4 : implicit motives and TEIMS						
Intercept	4.70	0.06	75.62	118	< .001***	[4.59, 4.83]
Implicit achievement motive	0.02	0.06	0.41	127	.680	[–0.09, 0.15]
Implicit affiliation motive	0.08	0.06	1.26	128	.208	[–0.05, 0.19]
Implicit power motive	0.07	0.06	1.06	116	.293	[–0.06, 0.19]
TEIMS	0.28	0.07	4.09	123	< .001***	[0.14, 0.41]
Model 5: Reappraisal and TEIMS						
Intercept	4.73	0.05	98.55	190	< .001***	[4.63, 4.82]
Reappraisal	0.11	0.06	1.85	197	.066	[–0.01, 0.23]
TEIMS	0.15	0.06	2.57	183	.011*	[0.02, 0.27]
Model 6: Prospective AO and TEIMS						
Intercept	4.74	0.05	99.52	190	< .001***	[4.64, 4.83]
Prospective action orientation	0.05	0.02	2.88	196	.004**	[0.01, 0.08]
TEIMS	0.15	0.05	2.84	198	.005**	[0.06, 0.26]
Model 7: Failure-related AO and TEIMS						
Intercept	4.73	0.05	100.48	189	< .001***	[4.63, 4.82]
Failure-related action orientation	0.05	0.02	3.30	187	.001**	[0.02, 0.08]
TEIMS	0.13	0.06	2.32	190	.021*	[0.02, 0.23]
Model 8: Self-motivation and TEIMS						
Intercept	4.74	0.05	104.07	187	< .001***	[4.66, 4.83]
Self-motivation	0.25	0.05	4.88	193	< .001***	[0.15, 0.34]
TEIMS	0.07	0.06	1.29	188	.200	[–0.04, 0.19]

Note. AO = action orientation. Satterthwaite approximation to degrees of freedom. All Level 2 predictors were grand-mean centered, except implicit motive scores, which were *z*-scores.

* $p < .05$ ** $p < .01$ *** $p < .001$

validity over self-motivation ability the results were mixed: The TEIMS was not a significant predictor of enjoyment during study participation and exercise, but of the vignette activities. I therefore continued testing the incremental validity over self-motivation ability (and the other constructs) regarding intrinsic motivation in three more studies. To increase the external validity of the findings, I investigated further activities and indicators of intrinsic motivation, including a behavioral indicator.

STUDY 4

PREDICTING BOREDOM AND VOLUNTARY PERSISTENCE DURING AN EXPERIMENTAL TASK

In Studies 2 and 3 I demonstrated that individual differences in experiencing intrinsic motivation, as measured by the TEIMS, predicted self-reported enjoyment of various activities. It generally did so over several established individual difference measures. To rule out that common response tendencies accounted for the associations between the TEIMS and the momentary experiences of intrinsic motivation in those studies, I aimed to replicate the findings with a behavioral indicator of intrinsic motivation. Voluntary persistence in activities is considered the gold standard for operationalizing intrinsic motivation (e.g., Deci, 1971; Lepper et al., 1973; Touré-Tillery & Fishbach, 2014), because it does not rely on self-report and addresses intrinsic motivation in the literal sense (Heckhausen, 1989; Kruglanski et al., 2018; Rheinberg & Engeser, 2018; Ryan & Deci, 2000b). I additionally operationalized intrinsic motivation as low boredom during the experimental task to internally replicate findings with a different dependent variable.

Like in the Pilot Study, I examined, how individual differences in experiencing intrinsic motivation would predict momentary intrinsic motivation depending on activity aversiveness. Therefore, I aimed to manipulate aversiveness by how boring a newly developed task in an online-experiment would be. I did so by introducing regular forced breaks (vs. no breaks) in a picture-word matching task. This task was designed to be novel, simple, and moderately long. I wanted it to be novel, so prior enjoyment of the activity would not confound the results. I wanted it to be simple, so

all participants would be able to solve it and hence would have no differences in intrinsic motivation due to differences in progress. Finally, I wanted it to be moderately long, in case individual differences in experiencing intrinsic motivation needed time to unfold their effect. Like in the previous two studies, I tested the predictive power of established traits and tested the incremental validity of the TEIMS.

METHODS

Participants and procedure. At wave 1, the study was conducted in a seminar on experimental methods in psychology (goal: $N = 100$; Actual N at the end of the semester = 71; age: $M = 24.55$ years, $SD = 6.30$; 70% female; 98% students). Thirty-two participants had been previously excluded due to the following reasons: Incorrect response to an attention-check item (six persons), German skills below the scale midpoint (two persons), and no data on voluntary persistence provided (24 persons). After significant results at wave 1, I decided to collect further data to attain more reliable estimators for publication (see Schönbrodt & Perugini, 2013). Based on the findings by Schönbrodt and Perugini (2013), I aimed at 250 participants, but sampling stopped at $N = 211$, when only few new participants kept rolling in despite intensified participant recruiting efforts. Here, another seven participants had been previously excluded based on their attention-check responses, another one based on his or her German skills, and another 21 for not providing data on voluntary persistence. The final sample is described in Table 1 as Sample E. I used a one-factorial between-subjects design with two groups (forced-breaks vs. no-breaks). Participants were randomly assigned to conditions.

This online study consisted of three parts and included measures that were not related to the research questions of the present thesis, so they will not be described here. The study was similar in structure to Study 2,—there were three study parts with at least two-hour long breaks break between them to avoid fatigue—but participants did not rate study participation enjoyment. The ostensible study purpose was to test materials for a primary school textbook to teach children how to read.

In the first part, participants completed a PSE and some additional measures. In the second part, participants completed a series of questionnaires, including the TEIMS. In the third part, participants completed the picture-word matching task, which was followed by the dependent variables: Participants rated their boredom during the task and indicated, if they wanted to continue with the matching task. Finally, participants were debriefed, thanked, and reimbursed.

Materials and measures.

The picture-word matching task. Participants should indicate for a series of pictures, what object was portrayed on them. For each picture, there were four answer options with possible content descriptors and one reading "Not clear." There were five pictures per page. In the forced-breaks condition, after every page there was a countdown of five seconds on the screen before participants could continue to the next page. This manipulation was supposed to bore participants, as they could not move swiftly through the very simple task to get their course credit. The task consisted of 140 pictures in the forced-breaks condition and 180 pictures in the no-breaks condition (picture numbers were reduced in the forced-breaks condition to keep the task lengths constant compared to the no-breaks condition; task lengths were not significantly different from each other at neither wave 1, nor the final sample; both $t < 1$).

Trait experience of intrinsic motivation. The TEIMS is described in Study 1 (wave 1: $\alpha = .83$; final sample: $\alpha = .81$).

Mood before picture-word matching task. Like in Study 2, participants indicated their current mood on the MDMQ; wave 1: $\alpha = .92$; final sample: $\alpha = .91$)

Boredom during picture-word matching task. After finishing the task, participants rated their boredom during the task on five items of the MSBS (see the Pilot Study; wave 1: $\alpha = .91$; final sample: $\alpha = .88$). Items were interspersed between distractor items.

Voluntary persistence in picture-word matching task. After answering the boredom and distractor items, participants could choose to work on 20 more images of the picture-word matching task or continue without this step. The

instructions were "You have completed the compulsory part of the picture-word task. Do you feel like working on 20 more pictures? Your decision has no influence on you obtaining the course credit. If you choose 'Yes', you may work on 20 more images. If you choose 'No', those 20 images will be skipped." Hence, participants knew that their decision to voluntarily persist in the task (or not) had neither positive nor negative external consequences. The only plausible reason to persist would therefore be intrinsic motivation in the task itself, especially, because study participation ended after this step.

Measures for test of incremental validity. All measures used here are described in Table 3. Trait positive affectivity was measured with the PANAVA-KS (wave 1: $\alpha = .84$; final sample: $\alpha = .81$), prospective and failure-related action orientations with the HAKEMP 90 (wave 1: $\alpha = .77$ and $\alpha = .78$, respectively; final sample: $\alpha = .79$ and $\alpha = .78$, respectively), and self-motivation ability with the VCI (wave 1: $\alpha = .89$; final sample: $\alpha = .90$).

RESULTS AND DISCUSSION

Wave 1.

Manipulation check. To test, if the boredom-manipulation was successful, I compared boredom scores between conditions. Participants in the forced-breaks and no-breaks conditions did not differ significantly in boredom ($M = 4.25$, $SD = 1.57$ vs. $M = 4.38$, $SD = 1.56$), $t(69) < 1$, $p = .720$. Apparently, the forced breaks failed to increase boredom compared to controls. Overall, the picture-word matching task could be considered a rather boring task.

Predictive validity of the TEIMS regarding boredom. I performed a simple linear regression to test, if the trait experience of intrinsic motivation would predict decreased boredom during the matching task. Results are shown in Table 10. The TEIMS had a moderate negative effect on boredom ($\beta = -.42$, $p < .001$, 95% CI [−.64, −.21]), which means that individuals with high (vs. low) trait experience of intrinsic motivation felt less bored during the picture-word matching task, regardless of condition. Controlling for mood did not change results significantly. Because the

manipulation had not been successful, I did not explore if the TEIMS would interact with task aversiveness in its prediction of boredom.

Predictive power of established constructs and incremental validity of the TEIMS regarding boredom. Comparably to the analyses in Studies 2 and 3, I included positive affectivity, prospective and failure-related action orientations, and self-motivation ability as predictors of boredom in a multiple linear regression. Table 11 displays the results. The overall model was not significant, $F(4, 65) = 1.60$, $p = .185$, $R^2 = .09$. Positive affectivity was the only significant predictor of boredom ($\beta = -.30$, $p = .039$, 95% CI [−.58, −.02]). *P*-values for the other measures ranged from .066 to .973. So, again, the established constructs, except for positive affectivity, were poor predictors of intrinsic motivation, this time operationalized as low boredom.

To test, if the TEIMS would predict boredom incrementally over the above, I included it as another predictor in the above model. I also ran separate models, only including one covariate at a time. Tables 7 and 11 display the results. The TEIMS predicted boredom over all covariates, both, when they were entered simultaneously and separately.

Table 10
Results of (Multiple) Regression Analyses for Variables Predicting Boredom (Studies 4 through 6)

Study	*N*	Predictor(s)	*B*	*SE*	β	*p*	*F*	R^2
Study 4 wave 1	71		—	—	—	< .001	15.10	.18
		TEIMS	**–0.74**	**0.19**	**–.42**	**< .001**	—	—
Study 4 final sample	207		—	—	—	< .001	19.33	.09
		TEIMS	**–0.47**	**0.11**	**–.29**	**< .001**	—	—
Study 5	75		—	—	—	.050	2.73	.14
		TEIMS	–0.22	0.19	–.18	.235	—	—
		condition	**–0.78**	**0.31**	**–.39**	**.014**	—	—
		TEIMS × condition	0.62	0.38	.24	.103	—	—
Study 6	121		—	—	—	< .001	28.98	.39
		TEIMS	**–0.38**	**0.12**	**–.37**	**.002**	—	—
		condition	**–1.75**	**0.22**	**–.88**	**< .001**	—	—
		TEIMS × condition	0.09	0.24	.04	.698	—	—

Note. TEIMS = Trait Experience of Intrinsic Motivation Scale. TEIMS scores were grand-mean centered before the calculation of the interaction terms. Values of significant predictors are printed bold. Rows without predictors display the values for the overall models.

Table 11

Results of Multiple Regression Analyses for Variables Predicting Boredom (Study 4, wave 1)

Predictors	*B*	*SE*	β	*p*	*F*	R^2	95% CI (β)
Model 1: Covariates only	—	—	—	.185	1.60	.09	—
Intercept	6.27	1.03	—	< .001***	—	—	—
Positive affectivity	–0.43	0.20	–.30	.039*	—	—	[–.58, –.02]
Prospective action orientation	0.15	0.08	.29	.066	—	—	[–.02, .60]
Failure-related action orientation	–0.00	0.06	–.00	.973	—	—	[–.25, .24]
Self-motivation	–0.21	0.21	–.14	.323	—	—	[–.42, .14]
Model 2: All covariates and TEIMS	—	—	—	.005**	3.75	.28	—
Intercept	7.88	1.07	—	< .001***	—	—	—
Positive affectivity	–0.23	0.20	–.16	.240	—	—	[–.44, .19]
Prospective action orientation	0.08	0.08	.17	.270	—	—	[–.13, .46]
Failure-related action orientation	0.00	0.06	.00	.999	—	—	[–.23, .23]
Self-motivation	0.13	0.22	.09	.557	—	—	[–.21, .38]
TEIMS	–0.79	0.24	–.45	.001**			[–.71, –.18]
Model 3: Positive affectivity and TEIMS	—	—	—	.001**	7.53	.18	—
Intercept	7.90	0.99	—	< .001***	—	—	—
Positive affectivity	–0.06	0.17	–.04	.707	—	—	[–.28, .19]
TEIMS	–0.72	0.21	–.41	.001**	—	—	[–.64, –.17]
Model 4: Prospective AO and TEIMS	—	—	—	.001**	8.17	.19	—
Intercept	7.51	0.92	—	< .001***	—	—	—
Prospective action orientation	0.06	0.06	.12	.280	—	—	[–.10, .34]
TEIMS	–0.77	0.19	–.44	< .001***	—	—	[–.66, –.22]
Model 5: Failure-related AO and TEIMS	—	—	—	.001**	7.51	.18	—
Intercept	7.67	0.93	—	< .001***	—	—	—
Failure-related action orientation	0.02	0.05	.04	.742	—	—	[–.18, .25]
TEIMS	–0.75	0.19	–.43	< .001***	—	—	[–.65, –.21]
Model 6: Self-motivation and TEIMS	—	—	—	< .001***	8.62	.21	—
Intercept	7.47	0.98	—	< .001***	—	—	—
Self-motivation	0.21	0.19	.14	.275	—	—	[–.11, .38]
TEIMS	–0.89	0.22	–.50	< .001***	—	—	[–.75, –.25]

Note. TEIMS = Trait Experience of Intrinsic Motivation Scale. AO = action orientation. Rows without predictors display the values for the overall models.

* $p < .05$ ** $p < .01$ *** $p < .001$

Predictive validity of the TEIMS regarding voluntary persistence. To test, if the TEIMS predicted voluntary persistence in the matching task, I performed a logistic regression with the TEIMS score on the choice to persist (0 = no, 1 = yes). Results are shown in Table 12. As predicted, there was a significant main effect for the TEIMS on persistence ($p = .026$). Participants high (vs. low) in the trait experience of intrinsic motivation were 1.96 times more likely to persist without external gains or pressures in the matching task regardless of condition. Controlling

for mood decreased the prediction by the TEIMS somewhat (odds ratio = 1.74, p = .082).

Table 12
Results of (Multiple) Logistic Regression Analyses for Variables Predicting Persistence (Studies 4 through 6)

Study and model	*N*	Predictor(s)	*B*	*SE*	OR	*p*	χ^2	*df*	R^2
Study 4 wave I TEIMS main effect model	71		—	—	—	.019	5.48	I	.10
		TEIMS	**0.67**	**0.30**	**1.96**	**.026**	—	—	—
Study 4 final sample TEIMS main effect model	207		—	—	—	.157	2.00	I	.01
		TEIMS	0.22	0.16	1.25	.160	—	—	—
Study 5 interaction model	75		—	—	—	.121	5.81	3	.10
		TEIMS	**0.80**	**0.37**	**2.22**	**.030**	—	—	—
		condition	–0.10	0.54	0.91	.856	—	—	—
		TEIMS × condition	0.22	0.73	1.25	.763	—	—	—
Study 5 TEIMS main effect model	75		—	—	—	.017	5.70	I	.10
		TEIMS	**0.78**	**0.34**	**2.19**	**.023**	—	—	—
Study 6 interaction model	122		—	—	—	.117	5.90	3	.06
		TEIMS	**0.49**	**0.21**	**1.63**	**.023**	—	—	—
		condition	0.14	0.39	1.15	.723	—	—	—
		TEIMS × condition	0.05	0.43	1.05	.915	—	—	—
Study 6 TEIMS main effect model	122		—	—	—	.016	5.75	I	.06
		TEIMS	**0.49**	**0.21**	**1.63**	**.021**	—	—	—

Note. TEIMS = Trait Experience of Intrinsic Motivation Scale. R^2 = Nagelkerke's R^2. Values of significant predictors are printed bold. TEIMS scores were grand-mean centered before the calculation of the interaction terms. Rows without predictors display the values for the overall models.

Because the manipulation had not been successful, I did not explore if the TEIMS would interact with task aversiveness in its prediction of persistence.

Predictive power of established constructs and incremental validity of the TEIMS regarding voluntary persistence. I included positive affectivity, prospective and failure-related action orientations, and self-motivation ability as predictors of voluntary persistence in a multiple logistic regression. Table 13 displays

the results. The overall model was not significant, $\chi^2(4) = 2.56$, $p = .635$, Nagelkerke's $R^2 = .05$. None of the scales were significant predictors of persistence (*p*s ranged from .252 to .930). Hence, the established constructs were again poor predictors of intrinsic motivation, this time operationalized as voluntary persistence.

To test, if the TEIMS would predict persistence incrementally over the above, I included it as another predictor in the above model. I also ran separate models, only including one covariate at a time again. The TEIMS predicted persistence over all covariates, both, when they were entered simultaneously and separately (see Tables 7 and 13).

Table 13

Results of Multiple Logistic Regression Analyses for Variables Predicting Persistence (Study 4, wave 1)

Predictors	*B*	*SE*	OR	*p*	χ^2	*df*	R^2	95% CI
Model 1: Covariates only	—	—	—	.635	2.56	4	.05	—
Intercept	–1.17	1.40	0.31	.401	—	—	—	—
Positive affectivity	0.25	0.27	1.28	.366	—	—	—	[0.75, 2.19]
Prospective action orientation	–0.12	0.11	0.89	.252	—	—	—	[0.72, 1.09]
Failure-related action orientation	0.09	0.08	1.09	.276	—	—	—	[0.93, 1.28]
Self-motivation	0.02	0.28	1.03	.930	—	—	—	[0.59, 1.77]
Model 2: All covariates and TEIMS	—	—	—	.137	8.36	5	.15	—
Intercept	–3.02	1.66	0.05	.069	—	—	—	—
Positive affectivity	0.08	0.30	1.09	.779	—	—	—	[0.61, 1.94]
Prospective action orientation	–0.07	0.11	0.93	.532	—	—	—	[0.75, 1.16]
Failure-related action orientation	0.09	0.09	1.10	.281	—	—	—	[0.93, 1.30]
Self-motivation	–0.38	0.35	0.69	.278	—	—	—	[0.35, 1.36]
TEIMS	0.89	0.40	2.42	.026*	—	—	—	[1.11, 5.28]
Model 3: Positive affectivity and TEIMS	—	—	—	.063	5.54	2	.10	—
Intercept	–3.17	1.55	0.04	.041*	—	—	—	—
Positive affectivity	–0.01	0.24	0.94	.803	—	—	—	[0.58, 1.52]
TEIMS	0.70	0.32	2.01	.030*	—	—	—	[1.07, 3.79]
Model 4: Prospective AO and TEIMS	—	—	—	.038*	6.55	2	.12	—
Intercept	–3.05	1.47	0.05	.037*	—	—	—	—
Prospective action orientation	–0.01	0.09	2.07	.306	—	—	—	[0.78, 1.08]
TEIMS	0.73	0.31	0.92	.020*	—	—	—	[1.12, 3.82]
Model 5: Failure-related AO and TEIMS	—	—	—	.039*	6.51	2	.12	—
Intercept	–3.68	1.50	0.03	.014*	—	—	—	—
Failure-related action orientation	0.08	0.08	1.09	.312	—	—	—	[0.93, 1.27]
TEIMS	0.66	0.30	1.93	.030*	—	—	—	[1.07, 3.48]
Model 6: Self-motivation and TEIMS	—	—	—	.031*	6.96	2	.13	—
Intercept	–2.49	1.51	0.08	.098	—	—	—	—
Self-motivation	–0.44	0.31	0.65	.153	—	—	—	[0.36, 1.18]
TEIMS	0.92	0.38	2.51	.017*	—	—	—	[1.18, 5.33]

Note. TEIMS = Trait Experience of Intrinsic Motivation Scale. AO = action orientation. R^2 = Nagelkerke's R^2. Rows without predictors display the values for the overall models.
* $p < .05$ ** $p < .01$ *** $p < .001$

Final sample. Even though results were already significant after wave 1, I decided to augment the sample to get more reliable estimators (Schönbrodt & Perugini, 2013). To this end, I aimed at 250 participants and managed to recruit 211 (see Table 1). Unlike with samples that were augmented after non-significant results (see Sagarin, Ambler, and Lee, 2014), the *p*-value does not need to be corrected when augmented after significant results, because the probability for unrightfully rejecting the null hypothesis does not increase in this case.

Manipulation check. In the final sample, the manipulation still showed no significant difference in boredom between the forced-breaks and no-breaks conditions (M = 4.23, SD = 1.43 vs. M = 4.31, SD = 1.41), $t(205) < 1$, p = .686.

Predictive validity of the TEIMS regarding boredom. The TEIMS still had a moderate effect on reduced boredom (see Table 10; β = –.29, p < .001, 95% CI [–.42, –.16]). Controlling for mood did not change results significantly. Because the manipulation had not been successful, I did not explore if the TEIMS would interact with task aversiveness in its prediction of boredom.

Predictive power of established constructs and incremental validity of the TEIMS regarding boredom. Like at wave 1, I included positive affectivity, prospective and failure-related action orientations, and self-motivation ability as predictors of boredom in a multiple linear regression. Table 14 displays the results. Again, the overall model was not significant, $F(4, 201) = 1.84$, p = .122, R^2 = .04. Contrary to the results at wave 1, none of the measures were significant predictors of boredom (*p*s ranged from .076 to .960). Positive affectivity stayed the strongest predictor of boredom (β = –.20, p = .076, 95% CI [–.31, .02]). Hence, the established constructs continued to be poor predictors of boredom in the larger sample.

To test, if the TEIMS would predict boredom incrementally over the above, I included it as another predictor in the above model. I also ran separate models, only including one covariate at a time again. The TEIMS predicted boredom over all covariates, both, when they were entered simultaneously and separately (see Tables 7 and 14).

Table 14

Results of Multiple Regression Analyses for Variables Predicting Boredom (Study 4, final sample)

Predictors	*B*	*SE*	β	*p*	*F*	R^2	95% CI (β)
Model 1: covariates only	—	—	—	.112	1.84	.04	—
Intercept	5.50	0.48	—	< .001***	—	—	—
Positive affectivity	–0.20	0.11	–.15	.076	—	—	[–.31, .02]
Prospective action orientation	0.00	0.04	.00	.960	—	—	[–.17, .18]
Failure-related action orientation	0.00	0.04	.00	.939	—	—	[–.14, .15]
Self-motivation	–0.08	0.11	–.07	.455	—	—	[–.24, .11]
Model 2: All covariates and TEIMS	—	—	—	.001**	4.27	.10	—
Intercept	6.50	0.54	—	< .001***	—	—	—
Positive affectivity	–0.11	0.11	–.08	.351	—	—	[–.24, .09]
Prospective action orientation	–0.01	0.04	–.02	.838	—	—	[–.19, .15]
Failure-related action orientation	0.01	0.03	.02	.803	—	—	[–.12, .16]
Self-motivation	0.12	0.12	.10	.310	—	—	[–.09, .29]
TEIMS	–0.51	0.14	–.32	< .001***	—	—	[–.49, –.15]
Model 3: Positive affectivity and TEIMS	—	—	—	.001**	9.87	.09	—
Intercept	6.50	0.53	—	< .001***	—	—	—
Positive affectivity	–0.07	0.10	–.05	.499	—	—	[–.20, .10]
TEIMS	–0.43	0.12	–.27	< .001***	—	—	[–.42, –.12]
Model 4: Prospective AO and TEIMS	—	—	—	< .001***	9.62	.09	—
Intercept	6.37	0.49	—	< .001***	—	—	—
Prospective action orientation	–0.00	0.03	–.00	.980	—	—	[–.14, .14]
TEIMS	–0.47	0.11	–.29	< .001***	—	—	[–.43, –.15]
Model 5: Failure-related AO and TEIMS	—	—	—	< .001***	9.67	.09	—
Intercept	6.35	0.49	—	< .001***	—	—	—
Failure-related action orientation	0.01	0.03	.02	.763	—	—	[–.12, .16]
TEIMS	–0.47	0.11	–.30	< .001***	—	—	[–.49, –.15]
Model 6: Self-motivation and TEIMS	—	—	—	< .001***	10.23	.09	—
Intercept	6.33	0.50	—	< .001***	—	—	—
Self-motivation	0.08	0.10	.07	.434	—	—	[–.10, .23]
TEIMS	–0.54	0.13	–.34	< .001***	—	—	[–.50, –.17]

Note. TEIMS = Trait Experience of Intrinsic Motivation Scale. AO = action orientation. Rows without predictors display the values for the overall models.

* $p < .05$ ** $p < .01$ *** $p < .001$

Predictive validity of the TEIMS regarding voluntary persistence.

Like at wave 1, I performed a logistic regression with the TEIMS score on the choice to persist (0 = no, 1 = yes). Results are shown in Table 12. In this larger sample, the main effect of the TEIMS was not significant ($p = .160$). To understand why the results regarding persistence changed from wave 1 to the final sample, I compared scores of the TEIMS, boredom, and persistence between waves. Independent sample *t*-tests between waves for TEIMS scores and boredom were not significant, $t(205) = 1.45$, $p = .148$ and $t(205) = 0.34$, $p = .738$, respectively. A χ^2-test of the wave by persistence interaction was also not significant, $\chi^2(1, N = 207) = 1.90$, $p = .168$. As there were no differences in these variables, they could not account for the changed

results regarding persistence between waves. I tested with post hoc sequential analyses, if the results at wave 1 were coincidental or occurred at several different sample sizes. Therefore, I calculated the logistic regression for sub-samples of the final dataset, starting with 20 participants and increasing the analysis *N* in steps of 20 in the order of participation. Figure 1 shows the results. The *p*-value was significant in the range from 60 to 140 participants, with the exception of *N* = 100. At *N* = 160 and beyond, the *p*-value was above statistical significance and increased with increasing *N*. This shows that the findings at wave 1 were not significant by chance only at that particular sample size, but that the association between the TEIMS and persistence occurred in a substantial portion of the sample. Yet, the continuous growth of the *p*-value beyond 140 participants indicates that, for unknown reasons, for many participants at wave 2 the mentioned association was not as in the rest of the sample.

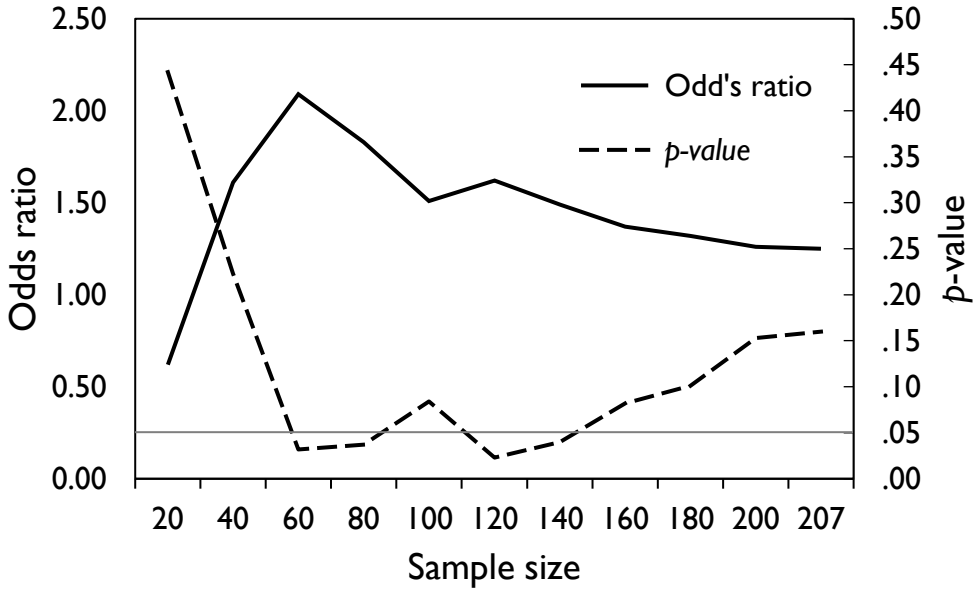

Figure 1. Odds ratios and p-values of logistic regression analyses predicting voluntary persistence by the TEIMS depending on sample size (Study 4, final sample). The straight grey line indicates the critical p-value of .05.

Predictive power of established constructs regarding voluntary persistence. Like at wave 1, I included positive affectivity, prospective and failure-related action orientations, and self-motivation ability as predictors of voluntary persistence in a multiple logistic regression. Table 15 displays the results. The overall model was not significant, $\chi^2(4) = 0.58$, $p = .965$, Nagelkerke's $R^2 = .00$. None of the scales were significant predictors of persistence (*p*s ranged from .642 to .919), so, again, the established constructs were poor predictors of persistence.

Table 15

Results of Multiple Logistic Regression for Variables Predicting Persistence (Study 4, final sample)

Predictors	*B*	*SE*	OR	*p*	χ^2	*df*	R^2	95% CI
Model 1: Covariates only	—	—	—	.965	0.58	4	.00	—
Intercept	–0.37	0.68	0.69	.588	—	—	—	—
Positive affectivity	0.02	0.16	1.02	.919	—	—	—	[0.74, 1.39]
Prospective action orientation	–0.01	0.06	0.99	.891	—	—	—	[0.89, 1.11]
Failure-related action orientation	0.02	0.05	1.02	.729	—	—	—	[0.92, 1.12]
Self-motivation	0.07	0.16	1.08	.642	—	—	—	[0.79, 1.47]

Note. TEIMS = Trait Experience of Intrinsic Motivation Scale. R^2 = Nagelkerke's R^2. The row without a predictor displays the values for the overall model.

* $p < .05$ ** $p < .01$ *** $p < .001$

STUDY 5

PREDICTING BOREDOM AND VOLUNTARY PERSISTENCE DURING A MEMORY TASK

In Study 4, the TEIMS significantly predicted voluntary persistence at the first wave of data collection, but not in the full sample. To clarify if there really was an effect on persistence and to replicate the effect on boredom, I conducted Study 5. Since the boredom manipulation failed with the newly developed picture-word matching task in Study 4, I used the boredom manipulation from the Pilot Study. This time, the experimental task was framed as a memory task, where participants had to recognize content from either the boring or interesting audio. For the critical dependent variable of voluntary persistence I asked participants, if they would like to listen to more of the audio and test their memory performance further. I predicted that participants, who were high (vs. low) in the trait experience of intrinsic motivation, would enjoy listening to the audio file and testing their memory more and therefore more readily choose to persist in that task, even though no external rewards or punishments were contingent upon their decision. Depending on the underlying processes of the TEIMS, such an effect might be particularly pronounced in the boring-audio condition or be independent of condition. Again, I tested the predictive power of established traits and the incremental validity of the TEIMS over and above them.

METHODS

Participants and procedure. Like Study 4, this study was conducted in a seminar on experimental methods in psychology and participants were recruited by the students (goal: *N* = 100; Actual *N* at the end of the semester = 76). Twenty-two participants had been previously excluded for the following reasons: Technical issues (one person), non-compliance with instructions (one person), German skills below the scale midpoint (two persons), and no data on voluntary persistence (18 persons). This study is based on Sample F (see Table 1). The study was similar in structure to Study 4, but consisted only of two instead of three parts, again divided by a break of at least two hours to avoid fatigue. It included measures that were not related to the research questions of the present thesis, so they will not be describe here. It was framed as two independent studies that were combined to reduce administrative efforts. I used a one-factorial between-subjects design with two groups (boring- vs. interesting-audio). Participants were randomly assigned to conditions and worked on the study online outside the lab.

In the first part, participants completed a PSE and some additional measures including the TEIMS. In the second part, participants worked on the ostensible memory task described in more details in the materials below. It consisted of listening to an audio file (after which covertly boredom was measured), working on a filler task, and then recognizing contents from the audio. Then, participants indicated, if they wanted to continue with a shorter version of the memory task or continue without this step. Finally, participants were debriefed, thanked, and reimbursed.

Materials and measures.

The memory task. Participants listened to 4 minutes of either the boring or the interesting audio while looking at a fixation cross. The audios were the same as in the Pilot Study (boring: History of professors; interesting: How infants find their feet). The instructions were as follows: “In order to obtain the course credit, it is important to you to listen to the complete audio file and, subsequently, work on the memory task. So try to remember the content as well as possible.” Then, participants

rated their boredom on items, which were interspersed between distractor items. They then filled out some questionnaires as a filler task until the memory test. The scales contained personality and self-regulation scales that were used in the nomological net in Study 1. In the memory test, participants indicated for 30 words, if they "appeared" in the audio, "did not appear" in the audio, or "don't know."

Trait experience of intrinsic motivation. The TEIMS is described in Study 1 (α = .76).

Mood before memory task. Like in Study 2, participants indicated their current mood on the MDMQ (α = .82).

Boredom during listening to audio. State boredom was assessed using five items of the MSBS (see Pilot Study; α = .83). Items were interspersed between distractor items after the audio.

Voluntary persistence in memory task. Participants could choose to listen to two more minutes of the audio file and test their memory (no filler task in between) or continue without this step. The instructions were "Thank you for your answers, the memory task is hereby finished. Do you feel like listening to two more minutes of the audio and afterwards test your knowledge further? Those questions are no longer part of our study and will not be analyzed by us. That is why the questions regarding memory performance are asked right after the audio file, without you having to fill out further questionnaires. So if you feel like listening to two more minutes of the audio and test your knowledge further, choose 'Yes' and click 'Continue'. If not, choose 'No' and click 'Continue'. Your decision has no influence on you obtaining the course credit or not." Hence, participants knew that their decision to voluntarily persist in the task (or not) had neither positive nor negative external consequences. The only plausible reason to persist would therefore be intrinsic motivation in the task itself.[4]

Measures for test of incremental validity. All measures used here are described in Table 3. Trait positive affectivity was measured with the PANAVA-KS (α

[4] To identify participants who might have guessed the study intentions, I used a funneled debriefing procedure in Studies 5 and 6 that was similar to the one described by Bargh and Chartrand (2014). As intended, none of the participants guessed the hypotheses in either of the studies.

= .76), prospective and failure-related action orientations with the HAKEMP 90 (both α = .81), and self-motivation ability with the VCI (α = .86).

RESULTS AND DISCUSSION

Manipulation check. To test, if the boredom-manipulation was successful, I compared boredom scores between conditions. Participants in the boring-audio (vs. interesting-audio) condition reported significantly greater boredom (M = 4.44, SD = 1.36 vs. M = 3.75, SD = 1.16), $t(73) = 2.35$, $p = .021$, $d = 0.51$.

Predictive validity of the TEIMS regarding boredom. To test, if the trait experience of intrinsic motivation would predict decreased boredom during listening to the audio, especially in the boring-audio condition, I performed a multiple regression with the TEIMS score, condition (0 = boring-audio, 1 = interesting-audio) and their interaction on boredom. Table 10 shows the results. Contrary to predictions, there was no significant main effect of the TEIMS on boredom (β = –.18, $p = .235$, 95% CI [–.47, .12]). There was a main effect for condition, but no interaction with the TEIMS. The association between the TEIMS and boredom was in the expected direction, but, unlike in the Pilot Study and Study 4, not significant. This might be due to insufficient power because of the small sample size.

Predictive power of established constructs regarding boredom. Like in Study 4, I included positive affectivity, prospective and failure-related action orientations, and self-motivation ability as predictors of boredom in a multiple linear regression. Table 16 displays the results. The overall model was not significant, $F(4, 70) = 0.90$, $p = .469$, $R^2 = .05$. None of the measures were significant predictors of boredom (ps ranged from .181 to .944), so the established constructs continued to be poor predictors of boredom in Study 5.

Table 16
Results of Multiple Regression for Variables Predicting Boredom (Study 5)

Predictors	*B*	*SE*	β	*p*	*F*	R^2	95% CI (β)
Model 1: covariates only	—	—	—	.469	0.90	.05	—
Intercept	4.93	0.79	—	< .001***	—	—	—
Positive affectivity	–0.22	0.16	–.18	.181	—	—	[–.44, .08]
Prospective action orientation	–0.00	0.05	.01	.944	—	—	[–.28, .27]
Failure-related action orientation	–0.04	0.05	–.10	.430	—	—	[–.35, .15]
Self-motivation	0.08	0.17	.06	.652	—	—	[–.21, .34]

Note. TEIMS = Trait Experience of Intrinsic Motivation Scale. The row without a predictor displays the values for the overall model.
* $p < .05$ ** $p < .01$ *** $p < .001$

Predictive validity of the TEIMS regarding voluntary persistence. To test, if the trait experience of intrinsic motivation predicted voluntary persistence in the memory task and if this association might be moderated by condition, I performed a logistic regression with the TEIMS score, condition (0 = boring-audio, 1 = interesting-audio), and their interaction on the choice to persist (0 = no, 1 = yes). Results are shown in Table 12. The omnibus test for model fit was not significant, but, as predicted, there was a significant main effect for the TEIMS ($p = .030$). For every point increase in the TEIMS, the odds to persist would increase by a factor of 2.22. There was no main effect for condition ($p = .856$) and no interaction effect of the TEIMS score × condition ($p = .763$). Controlling for mood did not change results significantly. To examine, if the omnibus test for model fit would be significant when dropping the non-significant predictors (condition and the interaction term), I repeated the analysis with TEIMS as the sole predictor of persistence (see Table 12). Here, the omnibus test was significant, indicating that the model containing the TEIMS as a predictor fit the data better than the null model without it.

The significant main effect of the TEIMS on persistence replicated the finding from wave 1 of Study 4, which suggests that the TEIMS could predict intrinsic motivation as operationalized by voluntary task persistence. Conceptually replicating the finding in the Pilot Study, the TEIMS did not interact with condition when predicting intrinsic motivation. This corroborates, that non-regulatory processes might underlie the trait experience of intrinsic motivation, which affect the experience of activities regardless of their overall aversiveness.

Table 17

Results of Multiple Logistic Regression Analyses for Variables Predicting Persistence (Study 5)

Predictors	*B*	*SE*	OR	*p*	χ^2	*df*	R^2	95% CI
Model 1: Covariates only	—	—	—	.600	2.76	4	.05	—
Intercept	–2.48	1.40	0.08	.078	—	—	—	—
Positive affectivity	0.03	0.27	1.03	.927	—	—	—	[0.60, 1.74]
Prospective action orientation	0.04	0.09	1.04	.663	—	—	—	[0.87, 1.24]
Failure-related action orientation	0.07	0.08	1.07	.436	—	—	—	[0.90, 1.26]
Self-motivation	0.22	0.29	1.25	.449	—	—	—	[0.70, 2.20]
Model 2: All covariates and TEIMS	—	—	—	.291	6.16	5	.11	—
Intercept	–4.54	1.87	0.01	.015*	—	—	—	—
Positive affectivity	–0.02	0.28	0.98	.933	—	—	—	[0.57, 1.68]
Prospective action orientation	0.02	0.09	1.02	.872	—	—	—	[0.85, 1.22]
Failure-related action orientation	0.05	0.09	1.05	.544	—	—	—	[0.89, 1.25]
Self-motivation	0.03	0.31	1.03	.933	—	—	—	[0.56, 1.90]
TEIMS	0.89	0.40	2.04	.072	—	—	—	[0.94, 4.45]
Model 3: Positive affectivity and TEIMS	—	—	—	.057	5.72	2	.10	—
Intercept	–4.55	1.79	0.01	.011*	—	—	—	—
Positive affectivity	0.04	0.26	1.04	.870	—	—	—	[0.63, 1.72]
TEIMS	0.77	0.36	2.15	.032*	—	—	—	[1.07, 4.33]
Model 4: Prospective AO and TEIMS	—	—	—	.055*	5.78	2	.10	—
Intercept	–4.42	1.67	0.01	.008**	—	—	—	—
Prospective action orientation	0.03	0.08	1.03	.768	—	—	—	[0.87, 1.21]
TEIMS	0.74	0.37	2.11	.042*	—	—	—	[1.03, 4.32]
Model 5: Failure-related AO and TEIMS	—	—	—	.047*	6.11	2	.11	—
Intercept	–4.57	1.69	0.01	.007**	—	—	—	—
Failure-related action orientation	0.05	0.08	1.05	.519	—	—	—	[0.90, 1.23]
TEIMS	0.75	0.35	2.11	.033*	—	—	—	[1.06, 4.17]
Model 6: Self-motivation and TEIMS	—	—	—	.057	5.72	2	.10	—
Intercept	–4.51	1.51	0.01	.009**	—	—	—	—
Self-motivation	–0.04	0.31	1.04	.890	—	—	—	[0.60, 1.82]
TEIMS	0.76	0.38	2.13	.051	—	—	—	[1.00, 4.56]

Note. TEIMS = Trait Experience of Intrinsic Motivation Scale. AO = action orientation. R^2 = Nagelkerke's R^2. Rows without predictors display the values for the overall models.
* $p < .05$ ** $p < .01$ *** $p < .001$

Predictive power of established constructs and incremental validity of the TEIMS regarding voluntary persistence. Like in Study 4, I included positive affectivity, prospective and failure-related action orientations, and self-motivation ability as predictors of voluntary persistence in a multiple logistic regression. Table 17 displays the results. The overall model was not significant, $\chi^2(4) = 2.76$, $p = .600$, Nagelkerke's $R^2 = .05$. None of the scales were significant predictors of persistence (*p*s ranged from .436 to .927), so, again, the established constructs were poor predictors of persistence.

To test, if the TEIMS would predict persistence incrementally over the above, I included it as another predictor in the above model. I also ran separate models, only

including one covariate at a time again. The TEIMS tended to predict persistence over all covariates, both, when they were entered simultaneously and separately (see Tables 7 and 17). In the models with self-motivation and all covariates, however, the TEIMS was only a marginally significant predictor (p = .051 and p = .072, respectively). Yet, overall, the incremental validity of the TEIMS regarding persistence found at wave 1 of Study 4 was corroborated in Study 5.

STUDY 6

FINAL REPLICATION REGARDING BOREDOM AND VOLUNTARY PERSISTENCE

In Studies 4 and 5, individual differences in experiencing intrinsic motivation in general, as measured by the TEIMS, predicted momentary intrinsic motivation, operationalized as low boredom and voluntary task persistence. Yet, results were not entirely consistent throughout the studies: In Study 4, the association between the TEIMS and persistence became non-significant after a certain sample size, and in Study 5 the TEIMS predicted voluntary persistence but not reduced boredom. To test which associations could be replicated, I conducted a final study with a very similar design to Study 5, but a more streamlined procedure and larger sample. To rule out that a possible interaction between the TEIMS and task aversiveness on intrinsic motivation was due to an insufficiently strong manipulation of aversiveness, I aimed to intensify the boredom manipulation. To this end, I replaced the interesting audio with a funny audio, and kept the boring audio in the memory task. Like in the previous four studies, I tested the predictive power of established traits and tested the incremental validity of the TEIMS over and above them.

METHODS

Participants and procedure. Based on the results from Studies 4 and 5, I aimed to recruit a sample size that was sufficient to detect an effect of TEIMS on persistence comparable to the effects in those studies. Therefore, I averaged the two

odds ratios (1.25 and 2.19, respectively), weighted by sample sizes (207 and 75 respectively). To find the resulting target odds ratio of (1.25 * 207 + 2.19 * 75)/(207 + 75) = 1.50 with a one-sided test and 80% power, I calculated a target N = 163. Sampling stopped at N = 143, when only few new participants kept rolling in despite intensified data acquisition efforts. Twenty-one participants were excluded from this study for the following reasons: Taking part in Study 4 or 5 (14 persons), audio file did not play (nine persons), and age under 18 years (one person). This study is based on Sample G (see Table 1). I used a one-factorial between-subjects design with two groups (boring vs. funny audio). Participants were randomly assigned to conditions and worked on the study online outside the lab.

The study was very similar to part two of Study 5. After giving informed consent, participants filled out the TEIMS and mood scales. They then worked on the memory task described in Study 5, except for a funny instead of an interesting audio in the respective condition. The funny audio was a stand-up comedy piece that was pre-tested for eliciting minimum boredom. Finally, participants were debriefed, thanked, and reimbursed.

Measures.

Trait experience of intrinsic motivation. The TEIMS is described in Study 1 (α = .86).

Mood before memory task. Participants indicated their mood on the positive affectivity subscale of the German state version of the PANAVA-KS (Schallberger, 2005; α = .76)

Boredom during listening to audio. State boredom was assessed using five items of the MSBS (see the Pilot Study; α = .90). Items were interspersed between distractor items after the audio.

Voluntary persistence in memory task. Participants could choose to listen to two more minutes of the audio file and test their memory or continue without this step. Instructions were identical to those in Study 5.

Measures for test of incremental validity. All measures used here are described in Table 3. Trait positive affectivity was measured with the PANAVA-KS (α

= .83), reappraisal with the ERQ (α = .84) prospective and failure-related action orientations with the HAKEMP 90 (α = .84 and α = .72, respectively), and self-motivation ability with the VCI (α = .87).

RESULTS AND DISCUSSION

Manipulation check. To test if the boredom-manipulation was successful I compared boredom scores between conditions. Participants in the boring-audio (vs. funny-audio) condition reported significantly greater boredom (M = 4.45, SD = 1.19 vs. M = 2.75, SD = 1.27), $t(119) = 7.64$, $p < .001$, $d = 1.40$.

Predictive validity of the TEIMS regarding boredom. To test, if the trait experience of intrinsic motivation would predict decreased boredom during listening to the audio, especially in the boring condition, I performed a multiple regression with the TEIMS score and condition (0 = boring-audio, 1 = funny-audio) on boredom. Results are shown in Table 10. There was a main effect for the TEIMS on boredom (β = –.37, p = .002, 95% CI [–.59, –.14]) so individuals high (vs.) low in the trait experience of intrinsic motivation were less bored during the audio, regardless of condition. There was a main effect of condition on boredom (β = –.88, $p < .001$, 95% CI [–1.09, –.66]), so participants in the boring-audio condition felt more bored than in the funny-audio condition. Like in the Pilot Study and Study 5, the interaction between the TEIMS score and condition on boredom was not significant, $t(1, 117) < 1$, p = .698. Controlling for mood did not change results significantly.

Predictive power of established constructs and incremental validity of the TEIMS regarding boredom. I included positive affectivity, reappraisal, prospective and failure-related action orientations, and self-motivation ability as predictors of boredom in a multiple linear regression. Table 18 displays the results. The overall model was not significant, $F(5, 115) = 1.91$, p = .098, R^2 = .08. Like in Study 4, positive affectivity was the only significant predictor of boredom (β = –.23, p = .035, 95% CI [–.49, –.02]). P-values for the other measures ranged from .426 to

.872. So, again, the established constructs, except for positive affectivity, were poor predictors of boredom.

To test, if the TEIMS would predict boredom incrementally over the above, I included it as another predictor in the above model. I also ran separate models, only including one covariate at a time again. Tables 7 and 18 display the results. The incremental validity of the TEIMS was less pronounced here than in previous studies: It predicted boredom significantly over self-motivation and marginally significantly over reappraisal and both action orientations, but, for the first time, not over positive affectivity and additionally not over all covariates simultaneously.

Predictive validity of the TEIMS regarding voluntary persistence. To test, if the trait experience of intrinsic motivation predicted voluntary persistence in the memory task and if this association might be moderated by condition, I performed a logistic regression with the TEIMS score, condition (0 = boring-audio, 1 = funny-audio), and their interaction on the choice to persist (0 = no, 1 = yes). Results are shown in Table 12. Like in Study 5, the omnibus test for model fit was not significant and the predicted main effect of the TEIMS on persistence was significant (p = .023). For every point increase in the TEIMS, the odds to persist would increase by a factor of 1.63. There was no main effect for condition (p = .723) and no interaction effect of the TEIMS score × condition (p = .915). Controlling for mood did not change results significantly. To examine, if the omnibus test for model fit would be significant when dropping the non-significant predictors (condition and the interaction term), I repeated the analysis with TEIMS as the sole predictor of persistence (see Table 12). Here, the omnibus test was significant (p = .016), indicating that the model containing the TEIMS as a predictor fit the data better than the null model without it. This corroborates the predictive validity of the TEIMS for the momentary experience of intrinsic motivation, operationalized as voluntary persistence. Again, the effect seems to be independent of the aversiveness of the task, which implies non-regulatory processes underlying the TEIMS.

Predictive power of established constructs and incremental validity of the TEIMS regarding voluntary persistence. I included positive affectivity,

Table 18

Results of Multiple Regression Analyses for Variables Predicting Boredom (Study 6)

Predictors	*B*	*SE*	β	*p*	*F*	R^2	95% CI (β)
Model 1: covariates only	—	—	—	.098	1.91	.08	—
Intercept	5.24	0.73	—	< .001***	—	—	—
Positive affectivity	–0.32	0.15	–.23	.035*	—	—	[–.45, .02]
reappraisal	–0.13	0.16	–.09	.426	—	—	[–.30, .13]
Prospective action orientation	–0.01	0.05	–.02	.872	—	—	[–.26, .22]
Failure-related action orientation	–0.04	0.05	–.07	.470	—	—	[–.27, .13]
Self-motivation	0.11	0.16	.09	.498	—	—	[–.17, .35]
Model 2: All covariates and TEIMS	—	—	—	.114	1.76	.09	—
Intercept	5.50	0.77	—	< .001***	—	—	—
Positive affectivity	–0.27	0.16	–.20	.087	—	—	[–.43, .03]
reappraisal	–0.11	0.16	–.07	.507	—	—	[–.29, .14]
Prospective action orientation	–0.01	0.05	–.02	.889	—	—	[–.26, .23]
Failure-related action orientation	–0.04	0.05	–.07	.520	—	—	[–.27, .13]
Self-motivation	0.19	0.18	.15	.299	—	—	[–.14, .44]
TEIMS	–0.21	0.21	–.13	.322	—	—	[–.40, .13]
Model 3: Positive affectivity and TEIMS	—	—	—	.014*	4.44	.07	—
Intercept	5.31	0.63	—	< .001***	—	—	—
Positive affectivity	–0.27	0.15	–.20	.066	—	—	[–.42, .01]
TEIMS	–0.14	0.17	–.09	.395	—	—	[–.31, .12]
Model 4: reappraisal and TEIMS	—	—	—	.055	2.98	.05	—
Intercept	5.35	0.74	—	< .001***	—	—	—
reappraisal	–0.12	0.15	–.08	.429	—	—	[–.28, .12]
TEIMS	–0.26	0.16	–.17	.099	—	—	[–.37, .03]
Model 5: Prospective AO and TEIMS	—	—	—	.071	2.71	.04	—
Intercept	4.99	0.63	—	< .001***	—	—	—
Prospective action orientation	–0.02	0.04	–.04	.728	—	—	[–.24, .17]
TEIMS	–0.29	0.16	–.19	.072	—	—	[–.40, .02]
Model 6: Failure-related AO and TEIMS	—	—	—	.046*	3.16	.59	—
Intercept	5.04	0.62	—	< .001***	—	—	—
Failure-related action orientation	–0.05	0.05	–.10	.325	—	—	[–.28, .10]
TEIMS	–0.27	0.15	–.17	.072	—	—	[–.36, .02]
Model 7: Self-motivation and TEIMS	—	—	—	.067	2.76	.05	—
Intercept	4.99	0.62	—	< .001***	—	—	—
Self-motivation	0.07	0.16	.06	.624	—	—	[–.19, .30]
TEIMS	–0.38	0.19	–.25	.049*	—	—	[–.49, .00]

Note. TEIMS = Trait Experience of Intrinsic Motivation Scale. AO = action orientation. Rows without predictors display the values for the overall models.

* $p < .05$ ** $p < .01$ *** $p < .001$

reappraisal, prospective and failure-related action orientations, and self-motivation ability as predictors of voluntary persistence in a multiple logistic regression. Table 19 displays the results. The overall model was not significant, $\chi^2(5) = 3.58$, $p = .612$, Nagelkerke's $R^2 = .04$. None of the scales were significant predictors of persistence (*p*s ranged from .178 to .812), so, again, the established constructs were poor predictors of persistence.

To test, if the TEIMS would predict persistence incrementally over the above, I included it as another predictor in the above model. I also again ran separate models, only including one covariate at a time. The TEIMS predicted persistence over all covariates, both, when they were entered simultaneously and separately (see Tables 7 and 19). In the model including reappraisal as the only covariate, however, the TEIMS was only a marginally significant predictor (p = .069).

Table 19

Results of Multiple Logistic Regression Analyses for Variables Predicting Persistence (Study 6)

Predictors	*B*	*SE*	OR	*p*	χ^2	*df*	R^2	95% CI
Model 1: Covariates only	—	—	—	.612	3.58	5	.04	—
Intercept	–2.37	1.10	0.09	.031*	—	—	—	—
Positive affectivity	0.05	0.21	1.05	.812	—	—	—	[0.69, 1.60]
reappraisal	0.33	0.24	1.39	.178	—	—	—	[0.86, 2.23]
Prospective action orientation	–0.07	0.08	0.94	.376	—	—	—	[0.81, 1.08]
Failure-related action orientation	0.02	0.08	1.02	.799	—	—	—	[0.88, 1.18]
Self-motivation	0.08	0.24	1.08	.747	—	—	—	[0.68, 1.72]
Model 2: All covariates and TEIMS	—	—	—	.122	10.06	6	.11	—
Intercept	–3.62	1.29	0.03	.005**	—	—	—	—
Positive affectivity	–0.12	0.23	0.89	.595	—	—	—	[0.57, 1.39]
reappraisal	0.27	0.25	1.31	.275	—	—	—	[0.81, 2.12]
Prospective action orientation	–0.08	0.08	0.92	.303	—	—	—	[0.79, 1.08]
Failure-related action orientation	0.01	0.08	1.01	.923	—	—	—	[0.86, 1.18]
Self-motivation	–0.22	0.27	0.81	.428	—	—	—	[0.47, 1.38]
TEIMS	0.80	0.33	2.23	.014*	—	—	—	[1.17, 4.25]
Model 3: Positive affectivity and TEIMS	—	—	—	.039*	6.50	2	.07	—
Intercept	–2.57	0.99	0.08	.009**	—	—	—	—
Positive affectivity	–0.19	0.22	0.83	.389	—	—	—	[0.54, 1.27]
TEIMS	0.61	0.26	1.85	.018*	—	—	—	[1.11, 3.08]
Model 4: reappraisal and TEIMS	—	—	—	.046*	6.18	2	.07	—
Intercept	–3.17	1.19	0.04	.008**	—	—	—	—
reappraisal	0.15	0.23	1.16	.516	—	—	—	[0.74, 1.18]
TEIMS	0.42	0.23	1.53	.069	—	—	—	[0.97, 2.42]
Model 5: Prospective AO and TEIMS	—	—	—	.016*	8.28	2	.09	—
Intercept	–3.07	1.02	0.05	.003**	—	—	—	—
Prospective action orientation	–0.11	0.07	0.90	.121	—	—	—	[0.79, 1.03]
TEIMS	0.70	0.26	2.01	.007**	—	—	—	[1.21, 3.32]
Model 6: Failure-related AO and TEIMS	—	—	—	.055	5.80	2	.06	—
Intercept	–2.73	0.97	0.07	.005**	—	—	—	—
Failure-related action orientation	–0.02	0.07	0.98	.825	—	—	—	[0.85, 1.14]
TEIMS	0.50	0.22	1.67	.024*	—	—	—	[1.07, 2.56]
Model 7: Self-motivation and TEIMS	—	—	—	.026*	7.27	2	.08	—
Intercept	–2.64	0.98	0.07	.007**	—	—	—	—
Self-motivation	–0.28	0.23	0.76	.223	—	—	—	[0.48, 1.19]
TEIMS	0.73	0.30	2.08	.013*	—	—	—	[1.17, 3.71]

Note. TEIMS = Trait Experience of Intrinsic Motivation Scale. AO = action orientation. R^2 = Nagelkerke's R^2. Rows without predictors display the values for the overall models.
* $p < .05$ ** $p < .01$ *** $p < .001$

INTERIM CONCLUSIONS REGARDING THE TEIMS'S INCREMENTAL VALIDITY

The tests in Studies 4 through 6 indicated that the TEIMS has incremental validity when predicting intrinsic motivation, operationalized as low boredom and high voluntary persistence, over several established traits that are characterized by frequently experiencing positive affect, deriving pleasure from incentives, and successfully regulating emotions. With few exceptions, this held true when including covariates separately and simultaneously in the models. In Studies 2 and 3, the TEIMS did not always show incremental validity over self-motivation ability when predicting activity enjoyment. However, for the two operationalizations of intrinsic motivation in Studies 4 through 6, namely boredom and voluntary persistence, the TEIMS clearly showed incremental validity over self-motivation ability.

META-ANALYSES

ON THE TEIMS'S PREDICTION OF MOMENTARY INTRINSIC MOTIVATION (STUDIES 2 THROUGH 6)

The TEIMS did not predict PSE enjoyment in Study 2, exercise enjoyment in the control-intervention condition in Study 3, persistence in the full sample of Study 4, and boredom in Study 5. This might have had different reasons: (1) random variation may have led to non-significant results, even though an effect might actually exist (likely in Studies 2, 4, and 5, because the effects were found in other samples); (2) insufficient sample sizes may not have provided the statistical power needed to detect an effect of a certain size (especially likely in Study 5); (3) inconsistent instructions might have led to the null-effect in the control-intervention condition in Study 3. To estimate the average effect sizes of the TEIMS on momentary intrinsic motivation, I conducted three local meta-analyses, one for each indicator of intrinsic motivation. I calculated random effects meta-analyses using the metafor package (Viechtbauer, 2010) for R (R Core Team, 2014). To make effect sizes more comparable, I calculated effect sizes based on models without any of the covariates that may have been included in the analyses of the respective studies.

ACTIVITY ENJOYMENT

I used standardized coefficients from the multilevel models (Study 2, Sample D, and Study 3) as correlation coefficients (Peterson & Brown, 2005) and a Pearson correlation coefficient for PSE enjoyment in Study 2, Samples E and F. I used

Fisher's *z* transformations of these estimates. To select only one effect size per sample, in Study 2, Sample D, I averaged the effect of the TEIMS on enjoyment across tasks and did not include the effect on vignette activity enjoyment from the same sample (Field & Gillett, 2010). In Study 3, I averaged the effect over all three conditions. This resulted in three effect sizes that were included in the meta-analysis: Estimate = .19 [.03, .34] (Study 2, Sample D), r = .23 [.11, .35] (Study 2, Samples E and F), and Estimate = .18 [.04, .32] (Study 3). According to the test for heterogeneity, single effect sizes were comparable, $Q(2) = 0.34$, $p = .845$. The meta-analytic correlation (N = 642) was .21 (SE = 0.04), $p < .001$, 95% CI [.13, .28]. Thus, the TEIMS significantly predicted activity enjoyment with a small effect.

BOREDOM

I again used Fisher's *z* transformations. This resulted in the following four effect sizes: $r = -.13$ [−.26, .01] (Pilot Study), $r = -.30$ [−.44, −.17] (Study 4), $r = -.11$ [−.35, .12] (Study 5), and $r = -.21$ [−.39, −.03] (Study 6). According to the test for heterogeneity, single effect sizes were comparable, $Q(3) = 3.79$, $p = .285$. The meta-analytic correlation (N = 620) was −.20 (SE = 0.05), $p < .001$, 95% CI [−.30, −.10]. Thus, over the three studies, the TEIMS significantly predicted low boredom with a small effect.[5]

VOLUNTARY PERSISTENCE

Following Hasselblad and Hedges (1995; see also Ellis, 2010), I conceptualized the results of the logistic regressions as standardized mean differences (Cohen's *d*s) in the predictor (the TEIMS) between the groups in the dichotomous criterion (did or did not persist). The three effect sizes were $d = .20$ [−0.08, 0.47] (Study 4, full sample), $d = .61$ [0.12, 1.11] (Study 5), and $d = .45$ [0.07, 0.82] (Study 6). According to the test for heterogeneity, single effect sizes were comparable, $Q(2) = 2.54$, p =

[5] To estimate the average effect of the final TEIMS version on boredom, I repeated this meta-analysis without the effect size from the Pilot Study. Effect sizes were still comparable, $Q(2) = 2.05$, $p = .359$. The meta-analytic correlation (N = 403) was slightly larger than in the meta-analysis that included the effect from the Pilot Study, namely −.24 (SE = 0.05), $p < .001$, 95% CI [−.34, −.14].

.281. The meta-analytic mean difference (N = 404) was 0.36 (SE = 0.12), p = .004, 95% CI [0.12, 0.60]. Thus, over the three studies, the TEIMS significantly predicted voluntary persistence with a small effect.

When comparing the predictive power of the TEIMS with that of established measures of, for example, the Big Five, it seems to deliver comparable results. The TEIMS predicted the three indicators of intrinsic motivation similarly well as measures of extraversion predicted dating variety (rs ranged from .07 to .28) or conscientiousness predicted grade point averages (rs ranged from .13 to .27)(Paunonen, 2003).

GENERAL DISCUSSION

Every person has activities that he or she particularly enjoys and others that he or she would rather avoid, if possible. Likewise, there are various circumstances that can allow or deny a pleasant activity experience. Accordingly, previous research has yielded many insights on which contents and situational factors fill people's activities with pleasure or, more specifically, the experience of intrinsic motivation. Aiming to contribute a novel perspective, in the present thesis I explored the experience of intrinsic motivation during activities in general, that is, regardless of such content-related or situational influences. Based on a structural definition of intrinsic motivation, I argued that, in principle, all activity contents can potentially be intrinsically motivating, as long as an activity's goal is to some extent within the activity. Theories of intrinsic motivation have not yet considered individual differences in the general experience of intrinsic motivation, although established traits, like positive affectivity, implicit motives, and emotion regulation ability, suggest that such differences exist. Current individual difference constructs explicitly related to intrinsic motivation have neither conceptualized differences in the *general experience* of intrinsic motivation.

To address this gap in the literature, I explored in the present thesis, whether people could report such stable individual differences on a newly developed, six-item scale: the Trait Experience of Intrinsic Motivation Scale (TEIMS). After examining an initial version in the Pilot Study, I evaluated the final TEIMS's psychometric properties and nomological net in a large sample of almost 1000 adults in Study 1. Then, in five studies with various methodologies and activities, I tested its predictive and incremental validities regarding three indicators of momentary intrinsic

motivation, namely activity enjoyment, low boredom, and voluntary persistence. Overall, the results indicate that there are stable individual differences in the experience of intrinsic motivation (answering the first research question), that these differences are relevant for momentary intrinsic motivation in a variety of activities (answering the second research questions), even over and above established constructs, and that the TEIMS measures these differences validly and reliably. I now turn to discussing the findings and their implications in detail.

THE PSYCHOMETRIC PROPERTIES OF THE TEIMS

The TEIMS showed good psychometric properties. Despite consisting of only six items, including one negatively worded items, the TEIMS had good internal consistency, as indicated by Cronbach's α (Cronbach, 1951) and Guttman's λ_2 (Guttman, 1945). Therefore, a necessary precondition for unidimensionality of the items was met (Tavakol & Dennick, 2011). Further indicating unidimensionality, the CFA clearly confirmed the one-factor structure of the TEIMS (Tate, 2003). Scores were approximately normally distributed along the whole range of the TEIMS, so generally experiencing intrinsic motivation seems neither rare, nor ubiquitous. Further, respondents seem to be able and willing to report low scores, which is important for research and application. In research, this ensures sufficient variance, which facilitates detecting effects, meeting requirements of many statistical standard methods, and allows to investigate what causes low manifestations on the TEIMS (Moosbrugger & Kelava, 2007; Rasch et al., 2014). In application, low scores on the TEIMS can be used to identify individuals, who would benefit most from interventions targeted at increasing the trait that is measured by the TEIMS or interventions targeted at increasing the experience of intrinsic motivation in specific activities (e.g., in the workplace or in educational settings). Indicating that the TEIMS measures a stable trait, the test-retest reliabilities over 1 and 4 months were high.

The TEIMS showed strong measurement invariance regarding gender and partial strong invariance regarding time. This means that the TEIMS measures the same latent construct regardless of respondent gender and, with restrictions, across time

points. Regarding the partial strong invariance regarding time, specifically, the means of two items could not be equated across time points. As detailed in the results section of Study 1, these two items include references to time (namely "quickly" and "no matter how long"), which might evoke more recent examples of experiencing intrinsic motivation in respondents. Therefore, the means of these items would be less stable over time. This idea is speculative and the results regarding time should be interpreted with caution, because sample sizes were relatively small for this kind of analysis; hence, future research should test in larger samples if the observed patterns replicate.

THE NOMOLOGICAL NET OF THE TEIMS AND ITS THEORETICAL IMPLICATIONS

I analyzed a wide nomological net including 47 measures around the TEIMS. The TEIMS was related to many constructs in expected ways, but it was not redundant with any of them. Except for the large correlations with self-motivation ability, all correlations were small to moderate.

Established traits that suggest individual differences in the trait experience of intrinsic motivation. I argued in the introduction that several established traits, namely positive affectivity, extraversion, implicit motives, and emotion regulation ability, suggested individual differences in the trait experience of intrinsic motivation. I expected positive associations between all these traits and the TEIMS, except for implicit motives, for which I had no expectations. I did not formulate expectations for the TEIMS's relationships with implicit motives, because my predictions would have differed depending on unknown information (namely the overall ratio of incentives to disincentives in persons' activities and environments). Results were consistent with the expectations concerning positive affectivity, extraversion, and emotion regulation ability, and implicit motives were mostly unrelated to the TEIMS. Importantly, the positive correlation with *implicit* positive affectivity indicates that the associations between the TEIMS and measures of positive affectivity are not merely due to shared method variance. The findings regarding implicit motives might indicate that for individuals high in several implicit

motives the positive effect of pleasure from incentives might be nullified by the negative effect of displeasure from disincentives (Schultheiss et al., 2008). In summary, these results suggest that implicit motives overall are not related to the tendency to experience intrinsic motivation, while the frequency of positive affect in everyday life (trait positive affectivity and extraversion) and the ability to regulate one's emotions are.

Individual difference constructs explicitly related to intrinsic motivation. I also argued that individual difference constructs explicitly related to intrinsic motivation do not directly address differences in the experience of intrinsic motivation during activities in general. Specifically, I argued that so-called "motivational orientations" (Amabile et al., 1994, p. 950), as measured by the GMS-28 (Guay et al., 2003) or the Incentive Focus Scale (Rheinberg et al., 1997), concern differences in the extent to which intrinsic motivation is a reason for engaging in activities, but not how much people enjoy activities regardless of the reasons for engaging in them; with regard to measures of the autotelic personality (Csikszentmihalyi, 1975/2000), I argued that while they directly address individual differences in experiencing intrinsic motivation, they are limited in that they only target flow, but not other states of intrinsic motivation. As expected, the TEIMS was empirically distinguishable from these constructs.

The small to moderate overlap between measures of motivational orientations and the TEIMS might have resulted from two, possibly reciprocal processes. First, generally engaging in activities for activity-intrinsic reasons (high intrinsic motivational orientation) would plausibly increase the frequency of actually experiencing intrinsic motivation (high TEIMS score). Second, frequently experiencing intrinsic motivation and reaping its benefits for performance and well-being (e.g., Cordova & Lepper, 1996; Hennessey & Amabile, 1998; Ilardi et al., 1993) may vice versa increase the preference for activity-intrinsic incentives when deciding on which activities to engage in in the future. Consistent with both interpretations, high extrinsic motivational orientations tended to be negatively related with the TEIMS.

The autotelic personality was mostly unrelated to the experience of intrinsically motivated states in general, as measured by the TEIMS. This might seem surprising, because flow itself is an intrinsically motivated state. Yet, there are nine criteria for flow states (Csikszentmihalyi, 1990), which shows that flow is a very special case of an intrinsically motivated state. Hence, the meta-skills behind the autotelic personality, which are proposed to facilitate frequent flow experiences (e.g., general curiosity, persistence, and low self-centeredness), might be mostly irrelevant for experiencing states of intrinsic motivation outside of flow, such as mild excitement, reduced boredom, or plain enjoyment. The means-ends fusion theory (Kruglanski et al., 2018) can help understand, how flow and other intrinsically motivated states are different and hence, why more frequently experiencing one would not automatically lead to more frequently experiencing the other. The theory views intrinsic motivation as lying on a continuum based on the level of fusion between an activity and its goal. The experience of intrinsic motivation, for example in the form of enjoyment, is theorized to be a consequence of this fusion. Specifically, the affect that would be present at goal-attainment is carried over into the activity, and this happens the more the stronger the fusion. But even at maximum fusion, many of the criteria that are specified for the flow experience are not specified for the experience of intrinsic motivation in general, simply, because such criteria are usually not considered to be experiences felt at goal attainment. For example, I am not aware of any research that showed that time is perceived differently at goal attainment than it would be during goal pursuit, but *transformation of time* is one of the flow criteria (Csikszentmihalyi, 1990). The same might hold for further flow criteria such as *unambiguous feedback* or *challenge-skill balance*.

By drawing attention to such differences between flow states and intrinsically motivated states in general and by demonstrating that their experienced frequencies are mostly independent, the TEIMS has contributed to theoretical clarity in intrinsic motivation research and produced results that support an emerging structural view of intrinsic motivation, as put forth in the means-ends fusion theory (Kruglanski et al., 2018). It should be noted, though, that the deployed single-item measure of the autotelic personality (Allensbacher Markt- und Werbeträgeranalyse, 1995–2000) has its limitations, so future studies should aim to replicate the present findings with

more rigorous measures of the autotelic personality, such as ambulatory assessment (Abuhamdeh, 2000; Csikszentmihalyi, 1997). In sum, the trait experience of intrinsic motivation is a valuable addition to complement the existing two individual difference constructs explicitly related to intrinsic motivation.

Basic psychological need satisfaction. Previous research has focused a lot on how activity contents and situational influences allow persons to satisfy their basic psychological needs for autonomy, competence, and relatedness and thereby experience intrinsic motivation. We measured need satisfaction related to one month of gym exercise in Sample B, and the only significant relationship with the TEIMS was a small correlation with the need for competence. In part, the lack of associations between the TEIMS and basic need satisfaction might have been due to the limited context of exercising, and larger correlations might have emerged with a measure of basic need satisfaction in general (Gagné, 2003; Johnston & Finney, 2010). Yet, the present data suggests that two largely independent routes might contribute to the experience of intrinsic motivation: Activity contents and situational factors that lead to the satisfaction of basic needs and individual differences, such as the trait experience of intrinsic motivation.

Self-motivation ability. The only large correlation with the TEIMS was with self-motivation (as measured by the according subscale of the VCI, Kuhl & Fuhrmann, 1998). As noted earlier, at .58 it was well below the conventional threshold of .85 that would imply that the two scales measure the same latent construct (Brown, 2015). Also, the two scales had different relationships with momentary intrinsic motivation (self-motivation only predicted activity enjoyment, while the TEIMS additionally predicted boredom and persistence), which further indicates two distinct latent constructs. Two aspects might have contributed to the large correlation despite the different measurement intentions of the scales: (1) both scales include items that refer to boring or unpleasant activities and finding appealing aspects in activities; (2) both scales shared variance with third variables, namely self-regulatory traits. In sum, the self-motivation subscale of the VCI and the TEIMS were designed with different measurement intentions in mind, but share

some item contents and common variance with self-regulatory traits, which likely contributed to the large correlation between the scales. Importantly though, the correlation was not large enough by any conventional standards to imply redundancy between the scales and the different predictive capacities of the scales further suggest two different latent constructs.

Other constructs and conclusion. There were associations between the TEIMS and traits too numerous to discuss in detail. Positive relationships included those with behavioral activation, life satisfaction, trait mindfulness, openness to experience, agreeableness, playfulness, self-regulatory capacity (i.e., conscientiousness, trait self-control, and perseverance), the explicit achievement motive, and dispositional attitudes. Negative relationships included those with trait negative affectivity, behavioral inhibition, and neuroticism. Overall, the nomological net of the TEIMS paints the picture of a trait that is loosely related to aspects of positive affectivity, openness, and positive attitudes; effective emotion- and self-regulation; achievement motivation and competence; as well as approach rather than avoidance motivation—although these latter relationships might change with a future, revised version of the TEIMS, see the section on recommendations for such a revision below. In conclusion, the TEIMS's relationships with theoretically relevant constructs were mostly as expected and indicate that the TEIMS is not redundant with any of the 47 measures examined.

INDIVIDUAL DIFFERENCES AND MOMENTARY INTRINSIC MOTIVATION

Predictive and criterion validity of the TEIMS. The TEIMS predicted the self-reported enjoyment of 30 diverse activities from buying Christmas presents to mowing the lawn (Study 2), answering questions about these vignettes itself (Study 2), writing imaginative stories for the PSE (Study 2 and Samples E and F), filling out psychological questionnaires about oneself (Study 2), and exercising in the gym (Study 3). Further, it predicted low boredom and voluntary persistence in a simple picture-word matching task (Study 4) and a more challenging memory task (Studies 5 and 6). Hence, results from multiple methodologies converge to the conclusion that

the TEIMS predicts not only self-report indicators but also behavioral indicators of intrinsic motivation. This evidence of predictive validity—and criterion validity more broadly—also indicates that TEIMS scores reflect respondents' actual tendencies to experience intrinsic motivation, not mere beliefs about them.

Occasionally, the TEIMS failed to predict intrinsic motivation. Results of local meta-analyses nevertheless indicate that the TEIMS predicts intrinsic motivation with small effects, which makes its predictive capacity comparable to measures of the Big Five (Paunonen, 2003). The tests of heterogeneity were all clearly non-significant suggesting that effect sizes were comparable across studies. Hence, it seems plausible that in the rare cases, in which the TEIMS did not predict intrinsic motivation, the reasons may have been random variation, insufficient statistical power, and, in the case of the control-intervention condition in Study 3, inconsistent study instructions.

Further attesting to its criterion validity, there were several indications that the TEIMS was associated with momentary intrinsic motivation not merely due to demand characteristics (Orne, 1962) or participants' desire to be consistent in their responses (Salancik & Pfeffer, 1977): (1) the time differences between filling out the TEIMS and reporting current intrinsic motivation spanned up to a month in Study 3 (and hours to days in Studies 4 and 5), (2) the boredom items used in Studies 4 through 6 were interspersed between distractor items to cover measurement intentions, and, most importantly, (3) I used a non-declarative behavioral measure, namely voluntary persistence in a free choice paradigm, to operationalize intrinsic motivation in Studies 4 through 6.

Taken together, these results corroborate the criterion validity of the TEIMS (Cronbach & Meehl, 1955; Kane, 2001; Messick, 1995), meaning that it predicts what it theoretically is supposed to predict. The TEIMS can therefore complement variables identified in previous research (e.g., Deci & Ryan, 2000; Kruglanski et al., 2018) in their prediction of momentary intrinsic motivation.

Incremental validity of the TEIMS and predictive power of established traits. I also tested whether the TEIMS had incremental validity over positive affectivity, implicit motives, emotion regulation, and self-motivation. Simultaneously, I explored how well these traits themselves predicted outcomes.

Overall, they fared poorly. None of them predicted more than one indicator of intrinsic motivation, and even that usually not across studies with the same indicator: Self-motivation ability predicted activity enjoyment in Study 3 (but not Study 2), and positive affectivity predicted low boredom in two out of four instances. None of the established traits predicted persistence in any of the studies. In the light of these results it is particularly remarkable that the TEIMS predicted all indicators of intrinsic motivation and did so mostly incrementally over the established constructs, both, when one covariate or all covariates were controlled for. In addition to the results from the nomological net, this further indicates that the TEIMS captures a latent construct that has not been conceptualized, measured, and studied yet.

There were a few instances, where the TEIMS did not (or only marginally significantly) predict outcomes incrementally over established traits. The TEIMS became non-significant in three out of 44 models, where self-motivation or positive affectivity were included. The TEIMS became marginally significant in six further models, where reappraisal, action orientations, or self-motivation were included. Unsurprisingly, in these cases the TEIMS usually also became a marginally or non-significant predictor in the models with all covariates included simultaneously. Importantly though, the TEIMS usually remained a significant predictor over the same covariates in other studies with the same outcomes (e.g., the TEIMS did not predict boredom over positive affectivity in Study 6, but it did so in Study 4, etc.). So overall, especially considering how rigorously I tested the incremental validity of the TEIMS (particularly in the models containing four to eight theoretically relevant covariates simultaneously), its performance was solid.

Implications for goal pursuit and subjective well-being. Intrinsic motivation during activities has many benefits for performance, success, and well-being (e.g., Cordova & Lepper, 1996; Ilardi et al., 1993; Rivkin et al., 2016; Sheldon & Elliot, 1998; Zhang & Bartol, 2010). Persons experience intrinsically motivated activities as freely initiated (e.g., Kruglanski, 1975), are more committed to them (Kruglanski et al., 2011), and persist longer (e.g., Woolley & Fishbach, 2016), because they are inherently pleasurable and satisfying. This is, because the positive affect

associated with goal attainment already occurs during the activity, as the activity itself is, at least to some degree, the end for which it is pursued (Kruglanski et al., 2018). Hence, a stable tendency to experience intrinsic motivation should benefit long-term goal success and, in turn (e.g., Amabile & Kramer, 2011; Brunstein, 1993), increase subjective well-being. This notion was supported in the present thesis by the TEIMS's correlations with self-regulatory traits and all indicators of subjective well-being (high life satisfaction and positive affectivity, low negative affectivity; Diener, Suh, Lucas, & Smith, 1999). Note that the directions of causality are unclear for these relationships—both directions and reciprocal relationships seem plausible.

POSSIBLE PROCESSES UNDERLYING THE TEIMS

One remaining question concerns the (e.g., social-cognitive) processes underlying the reported individual differences in the experience of intrinsic motivation (see Fleeson & Jayawickreme, 2014). One possibility I tested is that persons with high TEIMS scores show behaviors that can be used to self-regulate intrinsic motivation. Such behaviors may include: (1) setting proximal goals (Bandura & Schunk, 1981), (2) using interest-enhancing strategies (Sansone et al., 1992), (3) fusing activity and goal, for example, by repeatedly and uniquely pairing the activity and goal with each other (Kruglanski et al., 2018), or (4) focusing on the process rather than the instrumentality of the activity (Fishbach & Choi, 2012; Freund & Hennecke, 2012). Results from three studies suggest that participants did not use such behaviors in a self-regulatory fashion (i.e., when needed during more aversive activities; Converse et al., 2018; Trope & Fishbach, 2000), because the TEIMS did not interact with activity aversiveness when predicting the momentary experience of intrinsic motivation.

It might be the case, though, that participants used such behaviors irrespective of necessity, for example, out of habit. This could explain the main effect of the TEIMS on intrinsic motivation. Moreover, there might be other, likewise inflexible, processes that explain this main effect. For example, processes related to positive affectivity might play a role. Positive affectivity was moderately correlated with the TEIMS and tended to predict low boredom. Trait positive affectivity is strongly

heritable (Clark & Watson, 1999) and associated with left prefrontal activity (Tomarken & Keener, 1998) as well as dopaminergic activity (Depue, Luciana, Arbisi, Collins, & Leon, 1994). Hence, the TEIMS might be partly based on such neuro-biological features related to automatic reward-processing.

Processes related to implicit motives, which I introduced as affective amplifiers that increase the (dis-)pleasure from motive-congruent (dis-)incentives (Schultheiss, 2008), do not seem promising based on the presented data. All correlations between the TEIMS and implicit motives were negligible, with one minor exception. This might indicate that persons high in implicit motives are also more prone to low intrinsic motivation due to motive frustration (Schultheiss et al., 2008), which overall might nullify the benefits of pleasure derived from incentives. Concluding, more research is needed to clarify, if differences in TEIMS scores result from habitual intrinsic motivation enhancing behaviors (which could be trained), automatic processes related to reward-processing (which are likely less malleable), or yet other processes.

IMPLICATIONS FOR BASIC QUESTIONS IN INTRINSIC MOTIVATION RESEARCH

Introducing individual differences in the tendency to experience intrinsic motivation informs discussions about two long-standing controversies in intrinsic motivation research: The definition of intrinsic motivation and its relation to extrinsic motivation. Since the beginning of the field in the early 20th century, intrinsic motivation was predominantly studied as the antithesis to extrinsic motivation (Heckhausen, 1989; Lepper & Henderlong, 2000). Researchers identified intrinsically motivating activity contents (Berlyne, 1960; 1966; Hunt, 1961; White, 1959; Woodworth, 1918) and situational factors (e.g., Deci & Ryan, 2000) that led to engagement regardless of extrinsic rewards and punishments. Additionally, extrinsic rewards were found to corrupt intrinsic motivation in many cases, further underscoring their antagonistic relationship (Deci, 1971; Lepper et al., 1973; Kruglanski, Friedman, & Zeevi, 1971).

Starting in the 1980s, however, research accumulated which showed that intrinsic and extrinsic motivations were not necessarily antagonistic or even separate categories of motivation. Instead, they were found to occur simultaneously, have additive effects, or be located on a single continuum (Amabile et al., 1994; Cerasoli et al., 2014; Fishbach & Choi, 2012; Freitas & Higgins, 2002; Goswami & Urminsky, 2017; Hennessey et al., 1989; Hennessey & Zbikowski, 1993; Kruglanski et al., 2018; Lepper, Corpus, & Iyengar, 2005; Ouyang et al., 2015; Woolley & Fishbach, 2016; in press). Most notably, Kruglanski and colleagues (Kruglanski et al., 2018; Shah & Kruglanski, 2000) proposed a structural model that regards intrinsic motivation as the extent to which a person perceives the activity to be fused with the activity's goal. Based on this, they proposed an intrinsicality continuum instead of viewing intrinsic and extrinsic motivations as different categories of motivation.

The present thesis contributes to these discussions about the definition of intrinsic motivation (content vs. structure) and its relation to extrinsic motivation (antagonistic vs. compatible; categories vs. continuum) in two important ways: First, it adds to the growing evidence that intrinsic and extrinsic motivations can co-occur. Participants in the reported studies showed various levels of intrinsic motivation during primarily extrinsically motivated activities, namely assigned experimental tasks and everyday goal-pursuit. They did so in activities of widely varying contents, from the extremely simple picture-word matching task (Study 4), to strenuous gym exercise (Study 3), from solitary study participation (Study 2) to social activities in some activity vignettes (Study 2), and from creative story writing in PSE (Study 2) to the more straight-forward memory task (Studies 5 and 6). These results are more consistent with a structural than a content-based view of intrinsic motivation and suggest that intrinsic and extrinsic motivations are not antagonistic, but lie on an intrinsicality continuum.

Second, the present research points to the relevance of individual differences when explaining the experience of intrinsic motivation. Neither basic need theory (Deci & Ryan, 2000), nor the means-ends fusion theory (Kruglanski et al., 2018) consider individual differences, so the TEIMS expands the understanding of the nature of intrinsic motivation. The presented data suggest that the trait experience of intrinsic motivation is more promising in this regard than established traits, like

positive affectivity or emotion regulation. The TEIMS is compatible with the structural model of intrinsic motivation, because its underlying processes might be naturally occurring individual differences in behaviors that facilitate the fusion of activities with their goals. In sum, the trait experience of intrinsic motivation calls attention to a new puzzle piece and helps interpret existing puzzle pieces in the explanation of intrinsic motivation and its relation to extrinsic motivation.

LIMITATIONS AND FUTURE RESEARCH

The research reported in the present thesis was not without limitations. First, participants were mostly university students. Students usually differ from the general public in unpredictable ways, but in one consistent way which may be relevant for TEIMS scores: Education (Hanel & Vione, 2016). Students' higher education might make them more interested and/or competent in various activities, which may result in a higher sample mean and a more positive skew in TEIMS scores compared to the general public. Arguably, university students also have more autonomy over how they spend their time. They can often choose, within limitations, which and how many courses they take and sometimes whether to physically attend a taken course or rather learn the contents from books or, where applicable, podcasts. Basic need theory (Deci & Ryan, 2000) suggests that such an autonomy-supportive environment would increase the intrinsic motivation experienced among university students, which would increase the mean and skew in TEIMS scores. Future research should test, if the results presented here replicate in more diverse samples and they should include the TEIMS in representative panel studies to provide norm values for it.

Second, the TEIMS had an unusual construction history. I did not create a large item pool and empirically distill it to the best set of items. This was the case, because the initial TEIMS version demonstrated surprisingly good psychometric properties and already predicted momentary intrinsic motivation in the Pilot Study. With a more conventional construction approach, researchers might identify items that measure the latent construct even better, but in the meantime the TEIMS is a valid and reliable tool. I give recommendations for how to possibly improve the TEIMS in a dedicated section below.

Third, I focused on establishing the experience of intrinsic motivation as an individual difference construct, which was an elaborate process; therefore, I could dedicate relatively little attention to identifying the TEIMS's underlying processes. As a first step, I tested how well it predicted momentary intrinsic motivation depending on activity aversiveness, but more work is needed to identify the definitive underlying processes; they are likely going to be non-regulatory in nature and influence intrinsic motivation at all levels of activity aversiveness. A novel approach, which was developed in the research project in which the present thesis is situated (see Hennecke, Czikmantori, & Brandstätter, 2018), might be useful to identify the TEIMS's underlying processes. In it, we combined qualitative and quantitative methods to investigate, how self-regulatory traits "get outside the skin" (Hampson, 2012, p. 315). Specifically, in a first step, we grouped open answers by participants, who described how they dealt with self-regulatory challenges that were presented as vignettes, into strategy categories based on the scientific literature. In a second step, we linked those strategies to self-regulatory traits in correlational studies and derived hypotheses for a large, confirmatory study. This confirmatory study was the third and last step, in which we investigated, if strategy use in everyday life would be the process that mediated the path from self-regulatory traits to self-regulatory success and thereby provide the evidence for how self-regulatory traits got outside the skin. Applied to the underlying processes of the TEIMS, this approach could include thinking aloud (e.g., Pressler & Afflerbach, 2012) about processes that facilitate the experience of intrinsic motivation during activities or, as above, written accounts in response to activity vignettes. In the next two steps, the obtained processes could be linked to the TEIMS and it could be tested if they mediated its prediction of the momentary experience of intrinsic motivation.

Once the TEIMS's underlying processes would be identified, its validity could also be tested based on the arguably more critical criterion of causal validation (Borsboom, Mellenbergh, & van Heerden, 2004), which was introduced to replace prominent models of construct validity (Cronbach & Meehl, 1955; Kane, 2001; Messick, 1995). Borsboom and colleagues (2004, p. 1067) state: "A test is valid for measuring an attribute if variation in the attribute causes variation in the test scores." Therefore, once the TEIMS's underlying processes are known and an

adequate experimental manipulation is found, one could test, if manipulating those processes would cause differences in TEIMS scores. This would be comparable to validating a weighing scale by demonstrating that it gives the higher readings the higher the load it carries. There are few tests in personality assessment for which this critical test of validity has been attempted. A positive exception is the Picture Story Exercise (McClelland et al., 1989; Schultheiss & Brunstein, 2010; Schultheiss & Schultheiss, 2014).

Moreover, future research should investigate how differences in TEIMS scores develop and to which extent they are malleable. It should examine the importance of genetic factors, especially regarding brain physiology and reward-processing, in relation to environmental factors, like parenting practices, teacher behaviors, and peer influences. It could also inform trainings aimed at increasing how much intrinsic motivation persons experience, so they can benefit more from its many advantages. The content of such trainings would have to target the TEIMS's underlying processes, which are yet to be pinned down. If these processes were found to be unmodifiable, researchers should design interventions targeted at compensating for low manifestations. Such interventions may enable persons to choose activities and environments that are intrinsically motivating specifically to them (Rheinberg & Vollmeyer, 2012) or attend to how the output from their activities is valuable to themselves or others (Hulleman, Godes, Hendricks, & Harackiewicz, 2010).

Cross-cultural research might contribute to answering many of the questions raised above. Culture can shape, how persons approach and experience activities (Falk, Dunn, & Norenzayan, 2010; Markus & Kitayama, 1991; Oishi & Diener, 2003). Different cultures might have practices, institutions, and norms that foster or undermine the development of high tendencies to experience intrinsic motivation. For example, as the TEIMS was clearly related to motivational orientations in the present thesis, future research could test, if cultures differ with regard to their overall motivational orientations and if such differences could account for potential differences in TEIMS scores. In such a case, it could be worthwhile to explore ways, in which cultures could increase their intrinsic motivational orientations and therefore the likelihood of their citizens to experience intrinsic motivation on a

regular basis. Therefore, the TEIMS should be translated into and validated in other languages. Our research team has started validating an English version of the TEIMS (see Appendix A) and a Dutch version is currently used in an international collaboration project.

POSSIBLE APPLICATIONS OF THE TEIMS

The TEIMS has great potential for applied settings. In principle, it can be useful anywhere, where predicting and fostering intrinsic motivation are of interest. The benefits of intrinsic motivation for performance are well-documented (e.g., Cordova & Lepper, 1996; Deci et al., 2001; Hennessey & Amabile, 1998; Ilardi et al., 1993; Lawler & Hall, 1970; Sheldon & Elliot, 1998; Zhang & Bartol, 2010), so fields that are concerned with predicting performance are often also interested in predicting intrinsic motivation; this is the case, for example, in personnel selection (Krause, 2017). Here, the TEIMS may help identify applicants, who will enjoy their work tasks more and hence be more effective and satisfied (Deci et al., 2001; Ilardi et al., 1993). The TEIMS could complement established measures of content-specific interest (e.g., Holland, 1997), because it captures the content-independent tendency to experience intrinsic motivation. This should be especially useful for positions that entail a large variety of work tasks, such as in research-related and creative jobs, or positions with partially unknown or unknowable work tasks, such as often the case in small startup companies, where usually few individuals have to take over various tasks and flexibly adapt to changing work affordances.

Educational settings are one example where fostering intrinsic motivation is of central interest (Ames, 1992; Cordova & Lepper, 1996; Heyman & Dweck 1992; Kusurkar et al., 2011). School teachers, for example, could identify students with low TEIMS scores and help them regulate their experience of intrinsic motivation during learning tasks. This could be done, for example, by providing activity-congruent incentives (Kruglanski et al., 1975), setting proximal goals (Bandura & Schunk, 1981), encouraging learning over performance goals (Heyman & Dweck 1992), focusing on the process rather than the instrumentality of learning (Fishbach & Choi, 2012;

Freund & Hennecke, 2012), and adding immediate rewards during learning (Woolley & Fishbach, 2016).

These two examples illustrate how the TEIMS could improve applied work in fields, which aim to predict and foster intrinsic motivation. There are further areas in which these aims are pursued, such as career counseling (e.g., Krause, 2017), personnel development (e.g., Thomas & Velthaus, 1990), or the treatment of clinical depression (e.g., Zuroff, Koestner, Moskowitz, McBride, Marshall, & Bagby, 2007), and future research should test the usefulness of the TEIMS in such contexts, too.

OUTLOOK: RECOMMENDATIONS FOR HOW TO IMPROVE THE TEIMS IN A REVISED VERSION

The aim of the present thesis was to introduce and explore the idea that individuals differ regarding their tendencies to experience intrinsic motivation during activities in general and to provide a useful measure of such individual differences. These aims were insofar achieved in that the methods that were used strongly suggest that such individual differences exist, that they can be assessed in self-report, and that the TEIMS does this in a valid and reliable fashion. With the TEIMS's strengths in mind, sensible priorities of future research include clarifying underlying processes, boundary conditions, and developmental aspects, as described above. Yet, with the TEIMS's limitations in mind, future research could in a parallel effort aim to improve upon the current version.

I have three major recommendations in this regard: First and foremost, researchers should develop a larger pool of possible TEIMS items and empirically reduce it based on item and resulting scale properties. They should test, if there are new items that improve the psychometric properties and predictive validity of the scale.

Second, researchers should broaden the variety of kinds of positive affect covered in the items. In the current version, items mostly focus on enjoyment, excitement, fun, low boredom, and pleasure, that is, emotions, of which many are indicative of approach goal attainment (Higgins et al., 1997). Based on the means-ends fusion theory (Kruglanski et al., 2018), it might be possible that the TEIMS mostly taps into

the experience of intrinsic motivation from activities that are fused with approach goals and less so with activities that are fused with avoidance goals. This possible omission could be corrected by including items with additional emotional qualities, such as calmness, relaxation, relief, contentment, and satisfaction, many of which are more indicative of avoidance goal attainment (Higgins et al., 1997). As a result, a few associations in the nomological net might change: In its current form, the TEIMS was positively correlated with measures of an approach temperament (BAS, extraversion, and positive affectivity; Elliot & Thrash, 2002) and negatively with those of an avoidance temperament (BIS, neuroticism, and negative affectivity; Elliot & Thrash, 2002); after adding items with further emotional qualities, the revised TEIMS's relationship with approach temperament might decrease and the relationship with avoidance temperament might change toward a more positive one. These further emotional qualities were not taken into account during the construction of the current TEIMS, because the article introducing the means-ends fusion theory (Kruglanski et al., 2018) was published almost three years after the construction of the TEIMS had finished.

Third, the TEIMS should retain its phenomenological and relatively "theory-open" character. While the means-ends fusion theory points to the above described possibility of improving the TEIMS, it should be avoided that the TEIMS devolves into a measure that is too closely linked to a specific theory of intrinsic motivation. One of the current TEIMS's strengths is arguably that items directly address the phenomenon that the scale is supposed to measure and not a theorized antecedent or correlate of the targeted phenomenon. For example, an item like "I can take pleasure in most activities I engage in" directly prompts respondents to rate their tendency to experience intrinsic motivation in general (i.e., the desired phenomenon). Of course, what constitutes the experience of intrinsic motivation may differ somewhat from theory to theory (e.g., Amabile et al., 1994; Deci & Ryan, 2000; Kruglanski et al., 2018), so the TEIMS could (and should) never be entirely theory-free. What I am specifically advising against, is to incorporate items referring to theorized underlying processes of intrinsic motivation, such as the four antecedents of means-ends fusion (Kruglanski et al., 2018). Such items could, for example, refer to a tendency to have unique links between one's goals and the activities to pursue them (e.g., "In general, I

pursue each of my goals with a specific activity, which serves no other purpose"), which would, according to means-ends fusion theory, contribute to a tendency to be intrinsically motivated and therefore experience intrinsic motivation in general. Such items might even load on the same latent construct as items of the TEIMS do. The problem with such items, however, is that they confound the *explanandum*, that is, the phenomenon that is to be explained, with a possible *explanans*, that is, a mechanism that is supposed to explain the phenomenon (Hempel & Oppenheim, 1948). Confounding explanandum and explanans in a scale can lead to circular reasoning and thereby hamper scientific progress (Boag, 2011). Therefore, I recommend that a future TEIMS version should retain the current TEIMS's phenomenological and relatively "theory-open" character.

CONCLUSION

Previous research has traditionally aimed at explaining the pleasurable and beneficial state of intrinsic motivation by specific activity contents and situational determinants. I complement this approach with the idea that individuals might also differ in their general tendency to experience intrinsic motivation. I found that participants reported such differences on the TEIMS and that these differences were reflected in their momentary intrinsic motivation during a variety of activities. More work is needed to understand the underlying processes, boundary conditions, and developmental aspects of the TEIMS, but already now it can inform theory building and improve the prediction of intrinsic motivation. The TEIMS is a valid and reliable research tool that might also prove valuable in applied settings.

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Appendix A

STUDY A1: VALIDATION OF AN ENGLISH TEIMS VERSION

The German TEIMS showed good psychometric properties. To enable research in English-speaking countries and facilitate cross-cultural research, our research team started validating an English version of the TEIMS with Mturkers. Therefore, a translation of the TEIMS was included in an otherwise unrelated study on self-regulation strategies. This study included measures of several personality and self-regulatory traits, so I could assess parts of the nomological net, in addition to looking at other psychometric properties, like internal consistency, normality, and factor structure.

METHODS

Participants and procedure. Power considerations were based on the aims of the self-regulation strategy project, which aimed at attaining stable estimators for their research question (Schönbrodt & Perugini, 2013). Therefore, 250 hits for workers from the USA and Canada were posted on Mturk. Seven participants were excluded, because they did not provide their IDs, incorrectly responded to an attention check item, or had missing values on all TEIMS items. This resulted in 243 participants for analyses (age M = 36.52, SD = 12.09, range = 19–74; 43% female; Sample H). Participants filled out an online survey on self-regulation strategies and personality and self-regulatory traits, which included the TEIMS. They received $4.00 as compensation.

Measures.

Trait experience of intrinsic motivation. I translated the final six-item TEIMS (see Study 1) into English and received expert comments to improve the translation from my supervisor Marie Hennecke. Table A1 shows item wordings.

Measures of the nomological net. The measures used here were the English versions of many of the measures described in Table 3 of the main manuscript. These

were measures of positive affectivity (Steyer et al., 1997), life satisfaction (Diener et al., 1985), action orientations (Kuhl, 1994), the Big Five (John et al., 1991), trait self-control (Tangney et al., 2004), perseverance (Duckworth et al., 2007), and self-motivation ability (Kuhl & Fuhrmann, 1998).

RESULTS AND DISCUSSION

Psychometric properties. Item-total correlations ranged adequately between .58 and .78, except for the negatively formulated item, $r = .30$, which is still acceptable. Internal consistency was good, Cronbach's $\alpha = .86$ and Guttman's $\lambda_2 = .87$, so items were averaged after recoding the reversely coded item ($M = 4.38$, $SD = 1.19$). Like for the German version, skewness (−0.35, $SE = 0.16$) was small (see Bulmer, 1979) and kurtosis (−0.26, $SE = 0.31$) was not significantly different from zero. Hence, both parameters again indicated adequate normality. Inter-item correlations ranged from .16 to .75 and the mean correlation after Fisher's z standardization was $r = .53$, which is larger than the .43 observed for the German version and slightly larger than the .50 threshold for good homogeneity suggested by Clark and Watson (1995). In sum, this English translation of the TEIMS showed many of the qualities of the original German version with mostly good item-total correlations, even larger internal consistency, adequate normality, but inter-item correlations that were slightly larger than recommended.

CFA. An unconditional one-factor model showed acceptable fit, $\chi^2(9) = 23.08$, RMSEA = 0.080, 90% CI [.040, .121], CFI = 0.97, TLI = 0.95. Standardized factor loadings of this one-factor model ranged from .33 to .85 (see Table A1).

Nomological net. Table A2 shows the correlations in the nomological net. In general, correlations were considerably larger than for the German version. While for the German version correlations were small to moderate (except for the large correlation with self-motivation ability), here correlations tended to be moderate to large. For example, correlations with trait positive affectivity were .58 and .60, respectively, compared to the .39 and .33 observed for the German version.

Correlations with prospective and failure-related action orientations were moderate to large. Correlations with the Big Five were most comparable to the ones found for the German version. Correlations with self-regulatory traits, including the Big Five's conscientiousness, were much larger than for the German version, ranging from .48 for trait self-control to .73 for self-motivation.

Table A1
Standardized Item Factor Loadings and Intercepts of the TEIMS in the CFAs (Study A1)

TEIMS item	Standardized factor loading (intercept)
1. In pretty much every situation, I find something that excites me.	0.81 (4.28)
2. If I have to carry out a boring task, with time, I find something in it that is fun to me.	0.85 (4.57)
3. If a duty is placed on me, I quickly find an aspect of the activity that appeals to me.	0.84 (4.81)
4. If an activity is no fun to me, this does not change, no matter how long I engage in it. (R)	0.33 (3.98)
5. There are very few situations, in which I would feel bored.	0.62 (3.96)
6. I can take pleasure in most activities I engage in.	0.83 (4.70)

Note. (R) = recoded before scale calculation.

Table A2
Nomological Net of the English TEIMS (Study A1)

Variable[Sample(s)] (measure name or abbreviation)	α	*M* (*SD*)	*r*
Positive affectivity and life satisfaction			
Positive affectivity (MDMQ)	.88	4.69 (1.50)	.58
Trait vigilance (MDMQ)	.87	4.13 (1.53)	.45
Trait relaxation (MDMQ)	.85	4.61 (1.43)	.45
Life satisfaction (SWLS)	.93	4.00 (1.65)	.60
Emotion regulation			
Prospective action orientation (HAKEMP 90)	.92	7.66 (4.16)	.58
Failure-related action orientation (HAKEMP 90)	.89	6.18 (3.97)	.48
Personality and self-regulation			
Neuroticism (BFI-K)	.76	3.49 (1.72)	–.46
Extraversion (BFI-K)	.75	3.73 (1.71)	.30
Openness to experience (BFI-K)	.50	5.00 (1.40)	.22
Agreeableness (BFI-K)	.43	4.76 (1.46)	.37
Conscientiousness (BFI-K)	.90	5.26 (1.11)	.55
Trait self-control (BSCS)	.91	4.48 (1.19)	.48
Perseverance (Grit Scale)	.83	5.20 (1.11)	.60
Self-motivation ability (VCI)	.88	4.73 (1.26)	.73

Note. All correlations were significant at $p < .01$.

There are several potential reasons, why the overlap between the TEIMS was considerably larger in this sample. First, the true relationship between the TEIMS and related constructs simply might be larger in the English-speaking world, in North America, or in the population of Mturkers. Second, random variation might have contributed the unusually large associations compared to the results in the much larger Swiss sample. Third, and most likely in my view, the data quality in this Mturk sample might have been lower than in the Swiss sample. Specifically, these Mturkers might have answered items in a more undifferentiated fashion, not considering the differences in item formulations. Consistent with this explanation Cronbach's alphas and the intercorrelations of all scales tended to be noticeably larger than in the Swiss sample. For identical scales in both samples (all except the Big Five), Cronbach's alphas were, on average, .06 larger. Concerning scale intercorrelations, for example, positive affectivity and life satisfaction were correlated at .78 (vs. .61 in the Swiss sample) or conscientiousness and trait self-control were correlated at .79 (vs. .67 in the Swiss sample). Ultimately, future studies will have to clarify if these large correlations in the English TEIMS's nomological net replicate in larger and in non-Mturk North American samples, and, if so, what the reasons likely are.

CONCLUSION REGARDING THE VALIDATION OF AN ENGLISH TEIMS

Our English translation of the TEIMS showed promising psychometric properties, like good internal consistency, normality, and a one-factor structure, but the unusually large correlations in the nomological net (as well as larger internal consistencies of and intercorrelations between scales in general) are concerning. I therefore advise caution in the interpretation of the presented results and encourage researchers to thoroughly validate an English version of the TEIMS (including predictive and incremental validities, which could not been examined in this sample) in large samples, also outside of Mturk.

Appendix B

GERMAN TEIMS ITEMS WITH INSTRUCTIONS

Bitte nutzen Sie die Antwortskala, um anzugeben, inwiefern folgende Aussagen auf Sie zutreffen.

1 = trifft überhaupt nicht zu
2 = trifft überwiegend nicht zu
3 = trifft eher nicht zu
4 = neutral
5 = trifft etwas zu
6 = trifft überwiegend zu
7 = trifft voll und ganz zu

1. Ich finde eigentlich in jeder Situation etwas, das mich (im positiven Sinne) reizt.
2. Wenn ich eine langweilige Aufgabe erledigen muss, finde ich mit der Zeit etwas an ihr, das mir Spass macht.
3. Wenn mir eine Pflicht auferlegt wird, finde ich schnell einen Aspekt an der Tätigkeit, der mir gefällt.
4. Wenn mir eine Tätigkeit keinen Spass macht, dann ändert sich daran nichts, egal wie lange ich sie mache.
5. Es gibt sehr wenige Situationen, in denen ich mich langweilen würde.
6. Ich kann den meisten Tätigkeiten, mit denen ich mich beschäftige, etwas abgewinnen.

Curriculum Vitae

Name	Thomas Czikmantori, Dipl.-Psych. (MSc equiv.)
Date of Birth	June 22nd, 1987
Place of Birth	Tirgu Secuiesc, Romania
Nationality	German

▪ Education

2015 – 2018	Doctoral Student, SNF Project: *If goal pursuit is no fun – then what? Thinking of one's goal as a self-regulatory strategy.* Advisor: Prof. Dr. Veronika Brandstätter-Morawietz. Supervisor: Dr. Marie Hennecke. Chair of Motivation, Volition and Emotion, University of Zurich, Switzerland.
2010 – 2011	Study Abroad at the University of Cambridge, UK (St Catharine's College; Erasmus Scholarship).
2007 – 2014	Diploma (Dipl.-Psych., M Sc. equivalent) in Psychology, University of Trier, Germany. Thesis: *Configurations of Social Desires in Couples and Relationship Functioning: A Latent Profile Analysis*.

▪ Academic Employment & Experience

2017	Assistant Specialist (Visiting Research Student), Laboratory on Life-Span Development and Motivation, University of California, Irvine, CA, USA. Mentor: Prof. Dr. Jutta Heckhausen.
2015 – 2017	Representative of Junior Researchers in Department Assemblies
2012 – 2013	Research Internship, Chair of Developmental Psychology, University of Trier, Germany.
2009	Research Assistant, Chair of Experimental Psychology and Methodology, University of Trier, Germany.
2009	Research Assistant, Chair of Social Psychology, University of Trier, Germany.

▪ Publications

Czikmantori, T., Hagemeyer, B., & Engeser, S. (in press). A Dyadic Typology of Social Desires in Couples. *Journal of Personality.*

Czikmantori, T. (2014). *Configurations of social desires in couples and relationship functioning: A latent profile analysis.* Unpublished diploma thesis, University of Trier, Germany.

▪ Conference Presentations: Talks (*Presenting Author)

Czikmantori, T.*, Hennecke, M., & Brandstätter, V. (2017, September). *Enjoy what you (have to) do! Dispositional Taking Pleasure Predicts Intrinsic Enjoyment and Persistence During Goal Pursuit.* Talk at the 15th Conference of the Swiss Psychological Society (SPS), Lausanne, Switzerland.

Czikmantori, T.*, Hennecke, M., & Brandstätter, V. (2017, May). *The Journey is Its Own Reward: Dispositional Taking Pleasure Predicts Intrinsic Experience and Persistence during Goal Pursuit.* Talk at the 10th Anniversary Meeting of the Society for the Study of Motivation (SSM), Boston, MA, USA.

Hennecke, M.*, Czikmantori, T. & Brandstätter, V. (2017, January). *Self-regulation from the bottom-up: An integration of trait and strategy approaches.* Talk at the 18th Annual Meeting of the Society for Personality and Social Psychology (SPSP), San Antonio, TX, USA.

Czikmantori, T.*, Hennecke, M., & Brandstätter, V. (2016, October). *Der Weg ist das Ziel: Freudvollere Zielverfolgung durch die Fähigkeit, Tätigkeiten etwas abzugewinnen [The journey is its own reward: More enjoyable goal pursuit due to the ability to take pleasure in activities].* Talk at the 36th Colloquium of Motivational Psychology, Erlangen, Germany.

Hennecke, M.*, Czikmantori, T. , & Brandstätter, V. (2016, July). *Self-regulatory strategies from the goal pursuers' perspective.* Talk at the 18th European Congress of Personality, Timisoara, Romania.

Czikmantori, T.* & Brandstätter, V. (2015, August). *Beyond the leadership motive pattern: An overview of the literature on configurations of implicit motives.* Talk at the 35th Colloquium of Motivational Psychology, Heidelberg, Germany.

Czikmantori, T.*, Hagemeyer, B., & Engeser, S. (2014, September). *Configurations of social desires in couples and relationship functioning: A latent profile analysis.* Talk at the 34th Colloquium of Motivational Psychology, Trier, Germany.

Czikmantori, T.*, Hagemeyer, B., & Engeser, S. (2014, February). *Konfigurationen sozialer Bedürfnisse in Paarbeziehungen: eine latente Profilanalyse [Configurations of social desires in couples: A latent profile analysis].* Talk at the 5th exchange between the Universities of Trier and Osnabrück, Germany.

▪ Conference Presentations: Posters (*Presenting Author)

Czikmantori, T.*, Hennecke, M., & Brandstätter, V. (2017, January). *The journey is its own reward: Increased enjoyment during goal pursuit due to the ability to take pleasure in various activities.* Poster presented at the 18th Annual Convention of the Society for Personality and Social Psychology (SPSP), San Antonio, TX.

Czikmantori, T.*, Hennecke, M., & Brandstätter, V. (2016, September). *Taking pleasure: Identifying intrinsic incentives during extrinsically motivated goal pursuit.* Poster presented at the 50th Congress of the German Psychological Association (DGPs), Leipzig, Germany.

Czikmantori, T.*, Hennecke, M., & Brandstätter, V. (2016, January). *Taking pleasure: Identifying task incentives during extrinsically motivated goal pursuit.* Poster presented at the Self-Regulation

Preconference of the 17th Annual Convention of the Society for Personality and Social Psychology (SPSP), San Diego, CA.

Czikmantori, T.*, Hagemeyer, B., & Engeser, S. (2015, September). *Investigating the couple as an entity: Links between configurations of social desires and relationship functioning*. Poster presented at the 14th Congress of the Swiss Psychological Association (SSP/SGP), Geneva, Switzerland.

Czikmantori, T.*, Hagemeyer, B., & Engeser, S. (2015, May). *Similar but unhappy: A communal profile of social desires in couples is crucial for relationship quality*. Poster presented at the 13th Congress of Master's Degree and Doctoral Students (LiMaDoKo), University of Zurich, Switzerland.

Czikmantori, T.*, Hagemeyer, B., & Engeser, S. (2014, September). *Configurations of Social Desires in Couples and Relationship Functioning: A Latent Profile Analysis*. Poster presented at the 49th Congress of the German Psychological Association (DGPs), Bochum, Germany.

Czikmantori, T.*, Hagemeyer, B., & Engeser, S. (2014, September). *Configurations of Social Desires in Couples and Relationship Functioning: A Latent Profile Analysis*. Poster presented at the 34th Colloquium of Motivational Psychology, Trier, Germany.

▪ Grants, Awards, and Prices

Travel Grant for Scientific Mentorship. Awarded by the Philosophical Faculty of the University of Zurich, Zurich, Switzerland ($2600).

Travel Grant for Short-Term Mentorship Abroad. Awarded by the PhD Program Psychology at the University of Zurich, Zurich, Switzerland ($1500).

SPSP Graduate Travel Award, 18th Annual Convention of the Society for Personality and Social Psychology (SPSP), San Antonio, TX ($500).

Czikmantori, T.*, Hennecke, M., & Brandstätter, V. (2016, May). *Taking pleasure: Identifying task incentives during extrinsically motivated goal pursuit. 3rd place in category "Best poster*: Doctoral students" at the 14th Congress of Master's Degree and Doctoral Students (MaDoKo), University of Zurich, Switzerland (ca. $250).